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AFTER BUSINESS HOURS

Stratford, 1950

(By David Saxby.)

The views expressed in articles published in this section are those of the contributors and not necessarily those of "The Australasian Manufacturer." They are selected for their interest value, whether controversial or not, and the comments of readers on the subject discussed are always welcomed by the Editor.

NO other poet or dramatist in the whole world has received the homage and reverence universally accorded to William Shakespeare. He gave the world beauty and a galaxy of characters, who have become part of the every-day life of the peoples of all the nations. All lovers are Romeos. All procrastinators are Hamlets. His verse comes naturally, even if sometimes unconsciously, into the speeches of Prime Ministers and the backyard fights of char-ladies.

The United States tribute to the "Swan of Avon" is the great Folger Library in Washington, where treasures of Shakespeariana are guarded with loving care. In Sydney, we have two tokens of our esteem. There is the delightful memorial statue that stands facing the entrance of the city's lovely Botanic Gardens. There stand Portia, Falstaff, Hamlet, Romeo and Juliet, ageless in the Sydney sunlight. Across the road, in the beautiful imposing building, the Public Library of New South Wales, is the second tribute, the Shakespeare room. Here is a room built specially, designed on gracious Elizabethan lines, to house the best collection of Shakespeariana in Australia. There is even an edition of the plays in Chinese. Stained glass windows, portraying Shakespeare's Seven Ages of Man, throw rich reflections on to the floor and on to the row after row of books, which record not only what Shakespeare himself said, but what men thought of Bill Shakespeare.

The greatest tribute of all comes, however, from his own Merry England, where the poet's birthplace has become a place of pilgrimage, Stratford-on-Avon.

Australians were fortunate last year in being able to see the company of players from Stratford, performing in their own cities, but this has probably only whetted their appetite and many would wish to be in Stratford now for the great Shakespearian Festival. Many Australians already in Britain will be making the pilgrimage to the poet's birthplace to see such exciting productions as "Measure for Measure", "Henry VIII", "Much Ado About Nothing", "Julius Caesar" and "King Lear". I am one of these pilgrims. I have been fortunate enough to visit Stratford on several occasions, including the opening night of the season, earlier this year.

So great was the response to the plays last year that the directors decided to introduce the first of the 1950 productions, weeks earlier than usual. This is the ninety-first season of the poet's plays being performed in Stratford and by the time 1950 comes to a close, a quarter of a million people from all over the world will have visited Stratford. It is a "must" on the list of every tourist and theatre lover.

Not only was the early opening of the season justified by the numbers of requests for advance bookings, but Nature herself seemed to smile her approval with a warm early Spring. Much earlier than is usual, the trees around Stratford burst into bloom and the River Avon wound her way through fields of crocuses and daffodils.

At first the town was relatively free of tourists and had a certain peaceful charm, such as it must have had in Shakespeare's own days when he was courting Ann Hathaway. The peaceful charm was considerably lessened, however, as the crowds of sightseers arrived, grimly determined to have their money's worth in the Shakespeare country.

Unfortunately, and unavoidably I suppose, this attractive town has become rather too commercialised. One is confronted by too many tea rooms, too many hotels and definitely too many Ye Olde Gift Shoppes, whose names forcibly remind one of the Bard, the Avon and Ann Hathaway. Everywhere there are signposts, pointing out the birthplace, the school, the cottage, the church, all the places which are supposed to have had some connection with Will Shakespeare's life and many which probably had none.

Of these places, I think my favourite will remain the Church of the Holy Trinity. Mellow with age, it stands in the graveyard on the banks of the lazy picturesque Avon. Here is the tomb of the poet, marked only by a plain stone slab, which bears the inscription beginning—

"Good friend, for Jesus sake forbear
To dig the dust enclosed here."

It was at the Church that I was asked, "Have you seen the local jam factory yet?" He was referring to the Memorial Theatre and I must admit I found the description rather apt. For the building, which was opened on April 23, 1932, is modern, definitely modern, in design. It contrasts strongly with the Tudor gables of the rest of the town. It is in a lovely setting and the Avon flows quietly by and it must be this contrast which makes the building seem ugly. Many people, however, speak enthusiastically of its "classical simplicity." It is interesting to note that the money to build the theatre was raised by public subscription and a large part of it came from America.

The theatre inside, however, is an actor's delight. It is equipped with the most modern theatrical contrivances. It seats 1,200 people and is completely self-contained, with its own wardrobes and workshops, where all the costumes, scenery and properties are made.

This was the setting for the opening night of what is proving to be a most successful season. The play was "Measure for Measure", that rollicking comedy with the tragic touches. Produc-

(Turn to page 36.)

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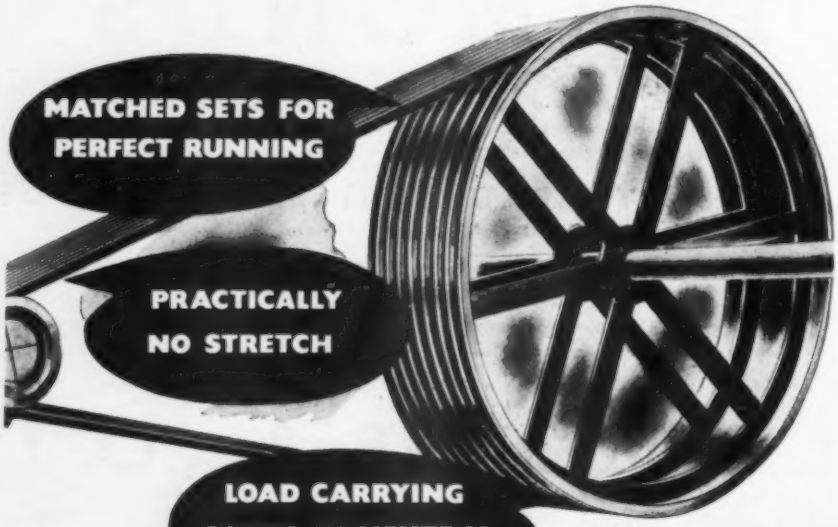

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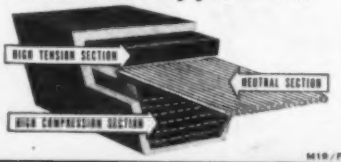

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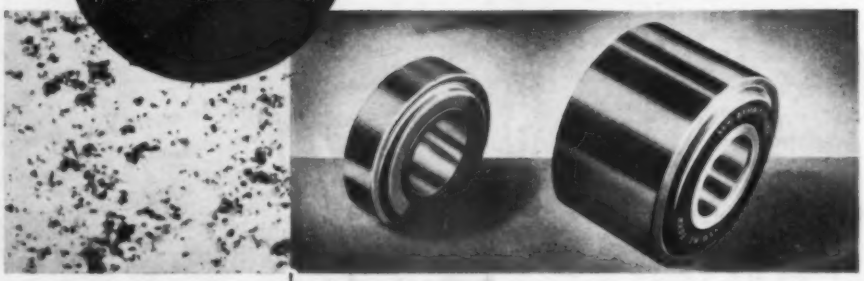

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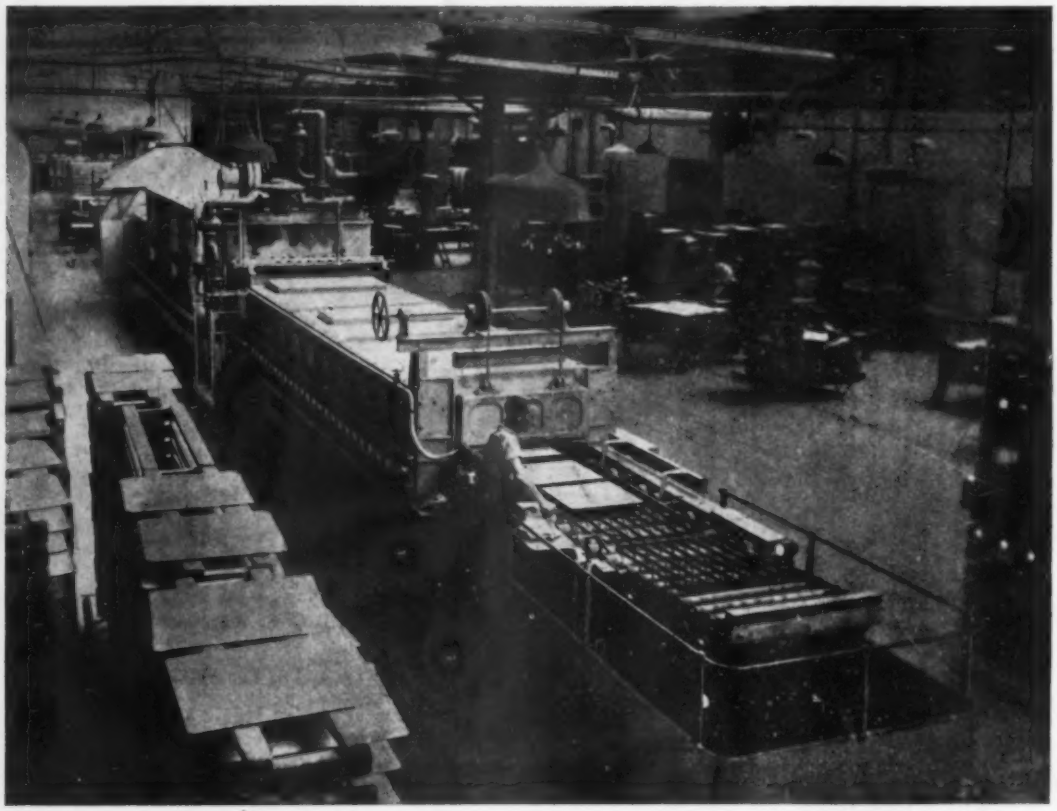

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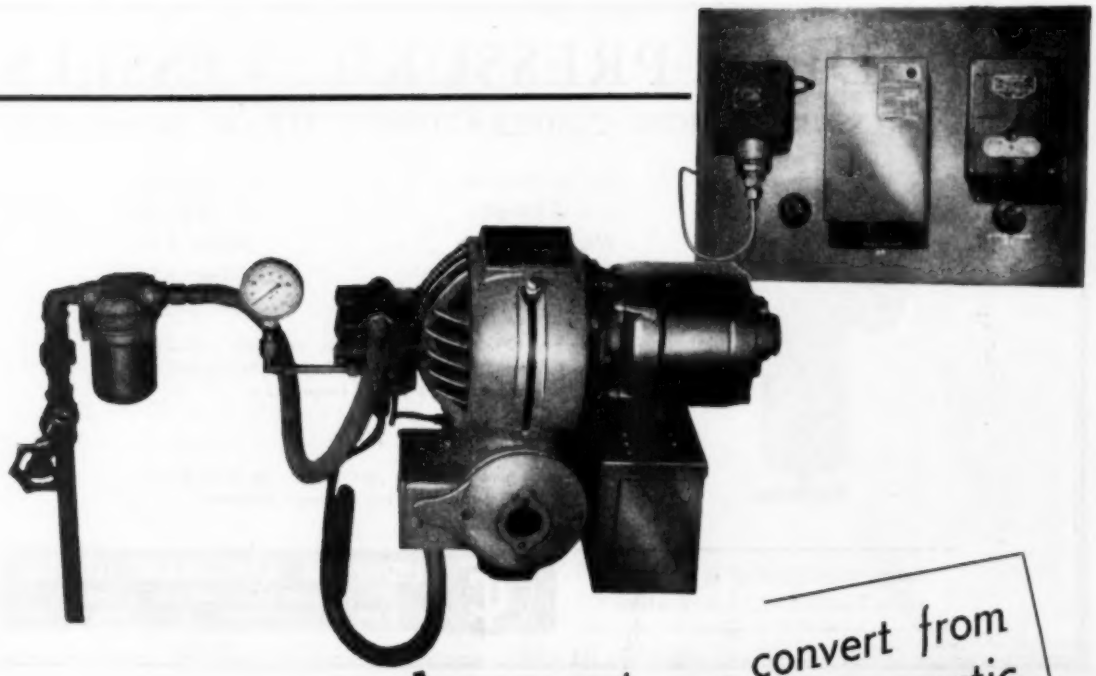

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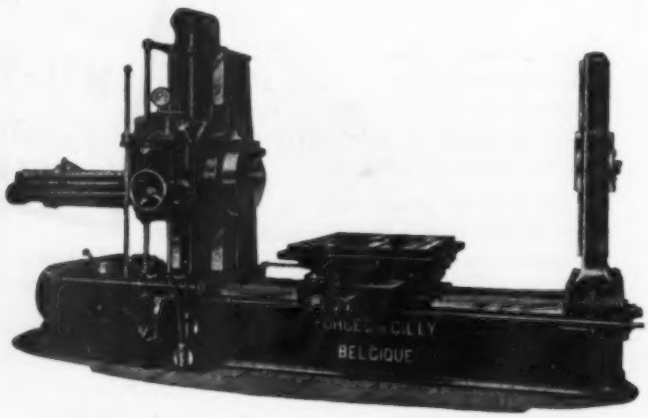

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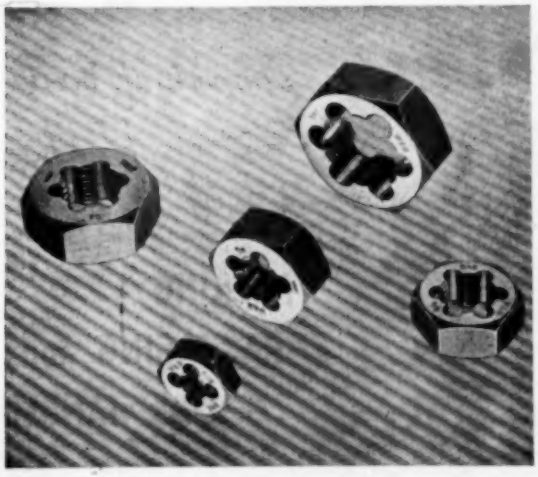

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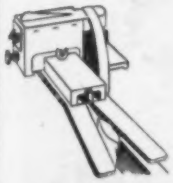
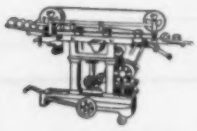
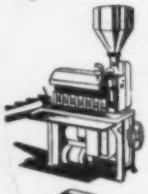
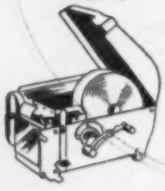








Westons
Packing Room Equipment

Important message for

Purchasing Officers ! ! !

Place your orders for your

PACKING
PACKAGING and
GOODS HANDLING REQUIREMENTS
NOW

Weston's Pty. Ltd. will be closed for Xmas Holidays on THURSDAY, 21st December, 1950 until WEDNESDAY, 3rd January, 1951.

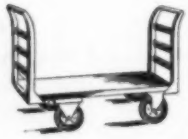
Westons
Packing Room Equipment

Please note that in addition to our Sydney Phone numbers BU 3346, 7, 8. BU 3761, **we have now two new lines BU 2118 and BU 2470.**

Westons
BOUND TO GET THERE
PROPRS. WESTON'S PTY. LIMITED

WESTON HOUSE, MACQUARIE PLACE, SYDNEY
TELEPHONES: BU 3346-7-8, BU 3761, BU 2118 and BU 2470.

MEL.: 188 Bay Street, Port Melbourne, Vic. (MX 6043)
ADEL.: 93 Flinders Street, Adelaide, S.A. (Cent. 5527)
NEWCASTLE: Organisation Pty. Ltd., King and Perkin Sts., Newcastle. (B 1637)
BRIS.: 121 Eagle Street, Brisbane, Qld. (B 3327)
PERTH: 18 William Street, Perth, W.A. (B 6693)
CAIRNS: P. L. & G. Potter, 91 Grafton Street, Cairns (Cairns 3188)



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Olympic

TELEPHONE WIRES AND CABLES

Olympic Cables Limited manufacture a complete range of wires and cables for telephone installation and maintenance.

OC39.8

PRODUCTS OF OLYMPIC CABLES LIMITED

FOUNDERS OF THE RUBBER INSULATED CABLE INDUSTRY IN AUSTRALIA

The illustration shows a section of the installation at the P.M.G. Central Telegraph Office, Melbourne.

Cat. No. L2025 Totally Enclosed Ceiling Fitting: Curved perspex diffusing panel; moulded bakelite ends in various colours; two 40 watt 4 ft. lamps. Can be supplied for continuous installations up to 20 ft.

HIGH-SPEED, ACCURATE WORK CALLS FOR

A.G.E.

The many A.G.E. Fluorescent installations in factories, offices and showrooms throughout the Commonwealth are a guarantee to architects and builders that they can specify and instal Mazda with assurance of complete satisfaction. Economical in both installation and operation, Mazda Fluorescent is a cooler light source, three times as efficient as the equivalent filament lamps. When used with scientifically designed lighting fittings, glare, shadows and reflections are reduced to a minimum. A.G.E. lighting engineers are always ready to assist with advice on your lighting installation.

fluorescent lighting

with B.T-H MAZDA fluorescent lamps

and A.G.E. low-loss Auxiliaries

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Sydney, Newcastle, Lismore, Melbourne, Brisbane, Rockhampton, Townsville, Adelaide, Hobart, Launceston. Agent in W.A.: Atkins (W.A.) Ltd.

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Box 4525, G.P.O., Melbourne.

Australia's National Manufacturers' Newspaper circulating in all States, New Zealand and Overseas. A weekly newspaper devoted to industrial efficiency and the manufacturing progress of Australia. Subscriptions within Australia and New Zealand (including Annual Number), £1/10/-; Great Britain and Possessions, £2; Foreign, £2/10/-. All subscriptions payable in advance. Microfilm subscription by arrangement.

Australia's New Industries

Gratifying Solidification of Recent Gains

"A significant settling down of the post-war boom in new manufacturing businesses in Australia was shown by a survey of industrial expansion during 1949-50. It is being followed by a period of healthy consolidation, a welcome trend which will establish those gains on a sound basis. Figures compiled by the Division of Industrial Development reveal that, although capital for new enterprises fell during the year, the total amount planned for industrial expansion as a whole (new enterprises and expansion of existing firms) was greater than ever."—Mr. R. G. Casey, Minister for National Development.

IT would be difficult to imagine a more heartening summing-up of the present and future manufacturing prospects of a nation which, though a relative newcomer into the fields of industry, has shown a measure of acumen and foresight in the matter of its industrialisation which rather might have been expected from a nation steeped in industrial experience and in industrial tradition.

Australia has good reason to be proud of her recent industrial achievements, achievements which have won her an honoured position among the modern manufacturing nations. She is determined, moreover, to strengthen that position and, in the fullness of time, to add to its stature and its importance.

Profound significance attaches to the fact that during the post-war years manufacturing expansion within the Commonwealth has been at a phenomenal tempo, some four thousand nine hundred organisations having invested over £210,000,000 in industrial enterprises in the five years to June, 1950. Of this total, over £60,000,000 was devoted to the launching of new undertakings.

Perhaps of even greater significance is the fact that at the present juncture this new industrial crop is taking the firmest of firm roots in Australian soil, entrenching itself deeply and well and sending out the healthy well-nurtured shoots of future development.

Historians will record that floodtide occurred in 1948-49, in which year there was an inflow of nine hundred and forty-six new enterprises, involving a capital outlay of £10,916,000. In the following year, new industries established totalled seven hundred and thirty, the capital involved being £8,016,000. The following table summarises the situation:—

New Industries.

	Aust.	U.K.	U.S.	Total
	£m.	£m.	£m.	£m.*
1945-48	18.8	15.7	5.6	41.1
1948-49	8.1	2.0	0.3	10.9
1949-50	5.4	1.8	0.5	8.0

*Including other sources.

Unquestionably the most interesting fact to emerge from the Division's survey is the spectacular expansion which occurred in 1949-50 in industries which had been established prior to 1949, some four hundred and sixty-three concerns carrying out expansion programmes, as compared with three hundred and fifty-seven in 1948-49, the capital involved rising steeply from £18,362,000 in the first period to £29,491,000 in the second. Here is the position at a glance:—

Old Industries.

	Aust.	U.K.	U.S.	Total.
	£m.	£m.	£m.	£m.*
1945-48	71.6	16.4	13.7	102.9
1948-49	11.6	5.8	0.7	18.3
1949-50	21.5	5.9	1.5	29.5

*Including other sources.

"It was clear," states the survey, "that during 1949-50 a much greater proportion of capital investment was going toward the strengthening and improvement of many of the new industries started immediately after the war. This trend was strikingly emphasised by the fact that while capital outlay for new ventures by companies with wholly Australian interest fell 33 per cent., planned expenditure for expansion by established companies of this type rose by 85 per cent. There was a similar shift of emphasis in overseas investment in Australian manufacturing industry."

The survey reveals that the metals group registered the major advances, investment rising to £14,318,000, compared with £9,823,000 in 1948-49. Included in this category are the heavy and light engineering, electrical, and radio undertakings. The group embraces the great iron and steel industries; the machinery shops; the shipbuilding yards; the motor car making and assembly plants; the locomotive workshops; the aeroplane factories; the electrical industries; the radio factories; and the countless workshops turning out a multiplicity of engineering products. Expansion within its ranks spells, accordingly, the coming forward of increased quantities of the basic essentials of virtually every branch of production—

the raw materials and the semi-processed items that constitute the very core of manufacturing production.

Next in importance were the food, drink, and tobacco industries, with £6,145,000, these in turn being followed by the chemicals, with £3,824,500.

Facts and figures of the character here recorded should convince Australians in particular and the world in general that this country has grasped with both hands the opportunities for manufacturing expansion offered in the post-war years.

But they do more than that.

They reveal a deep-seated determination to hold fast to what has been acquired; to strengthen and solidify the position of the newcomers in the industrial arena no less than to extend and multiply the activities of those previously functioning—to see to it that the new as well as the old shall rest on enduring foundations.

Thus will the great achievements of the present and of the past light the way to the even greater achievements of the future.

Pithy Jottings of Industry and Industrialists

"K.B.C." PROMOTIONAL WORK.

Mr. Ken Bowes, managing director of K. Bowes & Co. Ltd., of Woodlands Park, Adelaide, S.A., visited Sydney in late October with the company's recently appointed sales manager, Mr. John Morand. This visit was in the course of wide-flung sales promotional work which has been launched for K.B.C. domestic appliances, particularly their popular electric

MR. JOHN MORAND,
who has been appointed Sales Manager of K. Bowes & Co. Ltd., Woodlands Park, Adelaide, S.A

food-mixer, through the medium of the appropriate business houses of the capital cities. Eight leading Sydney houses have entered into the campaign.

Mr. Morand subsequently visited Melbourne, where strong support was also received.

Meanwhile in Adelaide demonstrations had been conducted on an extensive scale at the Myer Emporium, Harris Scarfe Ltd., and Gerard & Goodman Ltd. These demonstrations were organised by the stores in conjunction with K. Bowes & Co. Ltd., while similar displays were put on independently by a fourth big city house, John Martin & Co. Ltd. A talented young lady demonstrator did excellent work.

Mr. Morand, who originally hailed from Sydney, has had 14 years' experience in sales and advertising work, including radio and films. He has been in South Australia for the past five years, and for three of these was sales manager of "Filmads" (S.A.) Pty. Ltd.

K. Bowes & Co. are also manufacturers of electric hand drills, the long-established and familiar "K.B.C." wringer, and other lines.

* * * *

GIBSON, BATTLE BOARD.

Because of ill health, Mr. H. R. Freeman has resigned from the position of joint Managing Director of Gibson, Battle & Co. Ltd., Sydney. Mr. W. H. C. Lewis, previously joint Managing Director with Mr. Freeman, will continue as Managing Director. Mr. Freeman, however, remains a Director of the Company.

* * * *

VACUUM OIL RESEARCH SCHOLARSHIPS.

Applications for the Vacuum Oil Company Research Scholarships close with the Registrars of the Universities of Melbourne and Sydney on December 31 and January 15 respectively.

These scholarships—worth £500 a year—will be awarded in February each year.

They are being made available by Vacuum for research in the fields of chemistry, chemical engineering or mechanical or mining engineering, and are open to engineering and science graduates of any Universities in Australia. Research work under the scholarships, however, must be carried out at either Melbourne or Sydney Universities.

Selection of scholarship winners will be made by the Professorial Board of each University, on the recommendation of a committee consisting of the Professors of Chemistry, Chemical Engineering, Mechanical Engineering and Mining Engineering, and a representative of the Vacuum Oil Company Pty. Ltd.

* * * *

TOP-MANAGEMENT CONFERENCE.

"Industry's Prospects in '51" was the issue under discussion at the One-Day Top-Management Conference held at the University of Melbourne during the past week under the auspices of the Institute of Industrial Management. Conditions facing industry in the coming year and the factors involved in framing effective sales policies to meet these conditions were dealt with in a series of lectures by a number of the nation's leading industrialists. The gathering, like its forerunners, was an outstanding success.

* * * *

ANNUAL MEETING OF ASSOCIATED CHAMBERS.

The annual meeting of the Associated Chambers of Manufactures of Australia was held in Melbourne on the 6th inst. It was attended by representatives from all the States, the major issues confronting industrialists of today coming up for free and full discussion. The Presidential Address will be discussed at length in our next issue.

* * * *

RETIREMENT OF MR. C. H. HOSKINS.

The retirement is announced of Mr. Cecil H. Hoskins, general manager of Australian Iron and Steel Ltd., Port Kembla. Mr. Hoskins has been an outstanding figure in the Australian iron and steel world with which he has been directly associated for the past forty-two years.

* * * *

MONSANTO TO MANUFACTURE NYLON.

Monsanto Chemicals (Australia) Ltd., announce the local production of nylon. The Chemstrand Corporation, which is jointly owned by the American Viscose Corporation and Monsanto Chemical Company (American parent of the Australian offshoot), are to produce nylon yarn under licence from Du Pont. "Production of synthetic fibres," the company warns, "is a rapidly expanding development in the United States and it will have important effects upon the consumption of wool."

* * * *

HOMECRAFTS' GENERAL MANAGER.

The Directors of Homecrafts Pty. Ltd. have announced the appointment of Mr. Frank Lynch as General Manager. He succeeds Mr. Sladen Gibson, who recently resigned for health reasons. Mr. Lynch was with the firm of Keep Bros. and Wood Pty. Ltd. for 18 years before joining the Homecrafts organisation 5 years ago. He saw service with the A.I.F. in World War II, holding the rank of Captain in the Ordnance Corps. Homecrafts has 15 stores in three States—Victoria, N.S.W., and Tasmania.

* * * *

MR. FRANK LYNCH,
General Manager of Homecrafts Pty. Ltd.

MANUFACTURER'S GIFT OF GLOVES.

Following reports that Australian forces in Korea needed gloves in the severe wintry conditions, a South Australian glove

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(1) List of Manufacturers.

(2) Articles made in Australia and Names of Makers.

(3) Trade Marks and Brands.

1,184 PAGES

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manufacturer has announced a gift of 1,000 pairs to the R.S.L. for dispatch to the front.

Mr. A. S. Horne, of Prospect, managing director of A. S. Horne, Ltd., glove manufacturers, made the offer to the State president of the R.S.L. (Mr. T. C. Eastick). Made of warmly-lined leather, the gloves will be ready within two weeks. Mr. Eastick said that Mr. Horne's offer was received with gratitude by the R.S.L.

Mr. Horne said the gloves would be sent to Sydney, and flown to Korea for quick distribution before Christmas.

A former digger who had a son in World War II, Mr. Horne said his firm was anxious to help Australian soldiers get their gloves as quickly as possible.

Later Mr. Horne received a letter from the Federal R.S.L. president (Mr. George Holland), stating, "I need hardly tell you how much the Federal executive appreciates your splendid offer."

• • • •

BISCUITS AIR-FREIGHTED TO TASMANIA.

In order to keep faith with their clients in Tasmania, T. B. Guest and Co., biscuit manufacturers, Melbourne, last week sent by Bristol freighter over a million biscuits to the Island State. "It is the first time in Australia such a thing has been attempted," said Mr. R. G. Cousins, sales manager. "We promised the trade we would deliver the goods on schedule for the Christmas market. Because the port shipping hold-up delayed our plans, we decided to hire air transport from A.N.A."

This is a particularly interesting innovation, especially from the point of view of Tasmanian buyers.

• • • •

TUTT, BRYANT INCREASING FACTORY SPACE.

With the object of ensuring adequate space for manufacturing and for other projects, Tutt, Bryant Ltd., of Rydalmere, Sydney, is increasing its present factory space and is also making arrangements to purchase additional factory areas. Adelaide and Melbourne factories are also being expanded to cope with increased business.

• • • •

CEMENT CO. INCREASING OUTPUT.

Australian Cement Ltd., expects to increase production by 25 per cent. next year. It is extending its plant at Fyansford, Geelong.

A contract has been let to Perry Engineering Company, Adelaide, for kiln extensions.

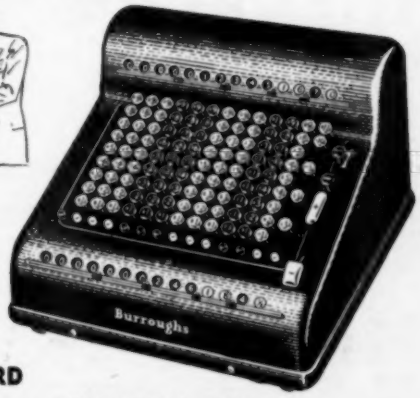
The first of six sections to be added to the existing kiln has been delivered.

This section, measuring 40 ft. with 11 ft. 6 in. diameter and 30 tons in weight, is the first of three for Number One kiln which will be extended from 400 ft. to 515 ft.

This undertaking is expected to be completed by the end of February and the second kiln to be extended before the end of next year.

Revolutionary "Memory-Dial"

BURROUGHS ELECTRIC CALCULATOR



It adds, subtracts, divides, multiplies electrically. 14 dial capacity totals up to £9,999,999,999.19.11§.

NEW DIRECT ACTION KEYBOARD SAVES 15% TO 40% OPERATING TIME

We've called it the machine "with a memory" because it picks up individual totals, gives the grand total automatically. You save 15% to 40% of operating time because it handles calculations faster . . . records amounts instantly the keys are depressed. Large percentage of calculations made on Sterling side of keyboard avoids errors in conversion to decimals. No motor bars, levers or other controls needed with the direct action keyboard. Simple and easy to use. Arrange for a demonstration in your own office today.

There's a Burroughs Machine for every Figuring, Accounting and Statistical need!

Burroughs Typewriter-Accounting Machines (General Accounting or Direct Multiplying Models). Slash time and cost of handling accounting work. Make posting practically effortless whether one or several records are being written.

Burroughs Electric Adding-Subtracting Machine. Has 10 column capacity, up to £9,999,999,19.11. Not affected by electricity blackouts, as it is built for handle or motor-bar operation.

To further help business, service staffs are always on hand in all Burroughs branches to keep business machines operating continuously and efficiently.

WHEREVER THERE'S BUSINESS THERE'S **Burroughs**

Burroughs Ltd., Head Office: 76 William Street, Sydney. Branches in all States.

Our editorial representative in each State makes regular calls on manufacturers, but if YOU wish to see some particular phase of your business given publicity, communicate immediately with the Editor, and he will arrange for a representative to call.

Viewing Industrial Developments — Around & About the FACTORY

A digest of new factory and plant construction, additions, alterations and improvements, and operating news of Australian industry.

Compressor Paint Unit

42-lb "Maid of All Work"

After three years of experiments and developments, J. W. Earnshaw Pty. Ltd., of 189-195 Pacific Highway, North Sydney, have placed on the market the Reilax spray paint unit, which has a diaphragm compressor giving trouble-free service and pure oil-free air.

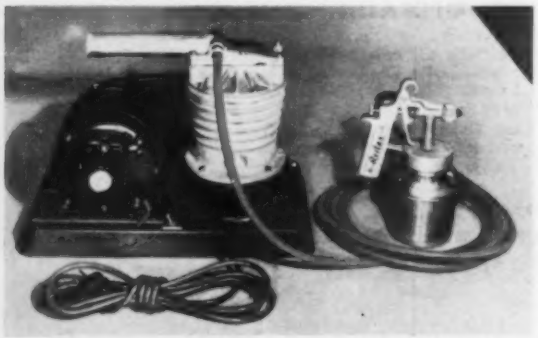
The unit is versatile, compact and portable. It has been made for continuous service in the home, farm or industry. Using the pressure-gun system, all paint materials—oil, water, enamels and lacquers can be easily, quickly and efficiently applied with the consistency of brushing. The makers say there is no need to thin down the paint so it will vaporise. The Reilax unit forces the paint, under pressure, into the atomising nozzle. A rubber diaphragm takes the place of the piston, and no trace of oil is allowed to escape into the air stream.

The total weight of the unit is 42-lb. Its maximum pressure is 30-lb., its capacity 2.2 cubic-ft. per minute. It has a Vee belt drive and belt guard, and a cast aluminium base. The can of the spray gun holds one quart. Three nozzles are supplied. The fan nozzle covers quickly large areas. The spotting nozzle is useful for smaller objects or cutting in, while the angle fan nozzle is for ceilings and floors. Hose up to 30-ft. in length can be used with no loss of efficiency.

The standard motor is ½ h.p., 240-volt., 50 cycle A.C. It has a 12-ft. flex and plug with the switch in the base. A motor of different voltage can be supplied. A petrol-driven unit is supplied for country use. Apart from painting, the compressor can be used for inflating car, truck or tractor tyres. Graziers are finding that the unit can also be used to apply insecticides to sheep. The pressure drives the insecticide to the base of the wool.

For factory use, the unit is an excellent acquisition. It is so easily carried that maintenance and painting work is soon done.

These same advantages are, of course, also available for brightening the home, painting boats and cars, and spraying insecticides in the garden. Seldom has so much versatility been packed into a 42-lb. unit.



"Reilax" Electric Paint Spraying Unit made by J. W. Earnshaw Pty. Ltd., of North Sydney.

Speed Control for Efficiency

Raymond Hydraulic Units Assist Production

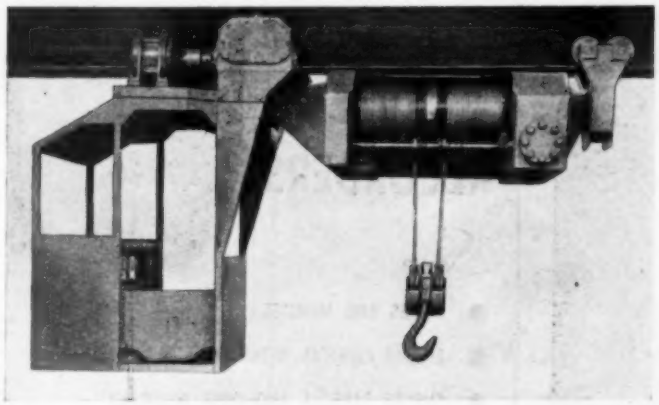
It is a recognised axiom in the industrial world that efficient production does, to a large measure, depend on correct working speeds of many types of machines. Correct working speed for any machine is essential for economic output. Speed, of course, varies with the nature of the work, the tools available, tolerances demanded and material used. Geared or fixed drives mean loss of productive efficiency. With a geared or fixed drive, a machine can only operate at maximum efficiency when the correct working speed coincides with the speed available. Too fast a speed or one too slow means poor work or wasted time. Steplessly variable speed is essential to maximum efficiency and economy. If speed can be varied instantly and steplessly to suit the job the peak of efficiency can be reached.

These industrial truisms are underlined and emphasised by the Raymond Hydraulic Transmission Coy., of 115 Sturt Street, South Melbourne, Victoria, manufacturers of hydraulic transmission gear.

The company claims its transmissions permit of instant speed selection by stepless variations while running under full load. The firm's products are of the constant torque type, with the objective of transmitting power in direct proportion of the output speed of the hydraulic motor. For instance, a unit transmitting 10 H.P. at 60 revolutions a minute will transmit five H.P. at 30 R.M.P. Consequently, it is not always necessary to have an electric motor as powerful as the maximum power transmitted. The Raymond unit comprises an hydraulic pump with infinitely variable delivery driving an hydraulic motor. Any variation in the pump's delivery produces an immediate variation in the speed of the motor's output spindle. The pump delivery control is effected either by a single control wheel or simple "push-pull" lever. The transmissions are designed to be driven at a constant speed—usually 700 R.P.M.—either by an electric motor or other power source. They can be coupled to any machine without clutches, gears or countershafts. The hydraulic pump and motor are con-

(Turn to page 24.)

Round as an igloo, this spherical head being constructed for the Argentine Government by Bethlehem Steel Company, is temporarily check-assembled in the fabricating shop. The head, constructed of steel plates 41 in. thick, will become part of a capsule-shaped gas holder 205 feet long. The Argentine order calls for 10 of the gas holders, each with a capacity of 500,000 cubic feet, to be supplied by Bethlehem Steel Export Corporation. Diameter of the head is 34 feet.



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4 Tons Lifting at 100 F.P.M.
3 Tons Lifting at 30 F.P.M.

SWIVELLING BOGIE SUSPENSION FOR CURVED MONORAIL

Totally Enclosed Travel Gearing. Individual Motor Drive allowing Differential Action on Curves. Travel Speeds up to 300 F.P.M.

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GLOBE VALVE
For Saturated STEAM
at 150 lbs. per sq. inch
and WATER, OIL or AIR
at 250 lbs. per sq. inch
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- PROMOTE EMPLOYEE GOODWILL

IBM INTERNATIONAL BUSINESS MACHINES PTY. LTD.

(Continued from page 22.)

nected by piping and so may be placed in any position relatively to one another. They can be close together or yards apart, allowing their use in confined or awkward places. The transmissions are made in standard or reversible models. The reversible motors have the same power and speed range, in either direction and control is the same. They are made for a wide range variety of speed and power outputs. Six pump and eight motor sizes permit of combinations transmitting from under one H.P. to more than 30 H.P., and a diversity of maximum speed outputs. Some typical applications for which the units can be used are surface grinders, internal profile grinders, profile boring machines, tapping and drilling, rubber and plastic extruders, saw milling, mining, steel plate bending rolls and conveyor systems.

Fractional Horsepower Motors

B.T.H.'s Wide Range

Many years of patient research and costly development lie behind the production of a wide range of B.T.H. fractional horsepower motors.

Australian General Electric Pty. Ltd. have just issued a new booklet describing these motors, the sizes of which range from one-fiftieth to one horsepower. However small, each motor has a big pull. They are efficient, quiet-running machines, capable of sustained service over long periods without replenishment of the oil supply. There is a B.T.H. fractional horsepower motor for every purpose. Choice of mounting for these sturdily-built British machines is a feature of some importance. There are motors without feet for accommodation in a cradle provided on the driven machine; motors with a cast base for ordinary workshop application; and motors resiliently mounted with or without automatic belt-tension adjuster, or with rubber-ringed bearing nose and latches for mounting in cradles. These resiliently mounted motors are for use where extra quiet operation is needed. The motors float in oil-proofed, rubber-lined clamps, and are thus insulated against the transmission of sound.

Split-phase motors are the simplest of all single-phase machines, and are most suitable for light industrial work and domestic operations. They will operate for years without attention, except occasional oiling. On applications such as washing machines, this type do not ever need lubrication. Twice full-load torque is exerted at starting, and the speed of the motors is practically constant, irrespective of variation in load. Motors for 50-cycle ratings are most popular, but motors for 40, 60, 83 and 100-cycle single-phase systems can be supplied. These single-phase A.C. split-phase induction motors are catalogued as Type BS. They have sleeve bearings and are drip-proof ventilated.

Type BC is the single-phase A.C. capacitor induction motor's range, which also has sleeve bearings and is drip-proof ventilated. Single-phase capacitor motors have the high starting torque of the repulsion motor, but with a high accelerating torque in addition, while retaining simplicity of construction. There is nothing to go wrong. There are no commutators or brushes used in any of the B.T.H. models. Transition from "start" to "run" is made automatically by a stationary switch. A centrifugal device operates this at a predetermined speed. Three to four times full load torque is exerted at starting, with a high run-up torque. These motors also can be supplied with a solid base or resilient mounting.

Australian General Electric have also recently issued a service manual for Hotpoint washing machines and a new price list for Mazda electric lamps. The manual gives a description of the proper operation of the washing machine, its mechanism and methods of adjustment, and its maintenance through lubrication and cleaning. The electric lamp list shows the wide range of these products, from torches to floodlights.

Splinter-Free Clothes Airer

Made by "Bedford Industries"

The ordinary type of household clothes airer in which wood splinters are a menace to nylons and silk things, are outmoded by a device introduced by Bedford Industries—factory of the Tuberculosis Association of South Australia, at Springbank.

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In the new airer all the wooden rungs are sheathed in plastic tubes. The tubes are of different colours which give this piece of furniture an attractive appearance.

The same type of plastic is being used at Bedford Industries in the rungs of playpens so that youngsters' fingers are also protected from splinters.

A big output of wooden bathmats and washing boards from Bedford Industries goes as far afield as Cairns (Queensland) and to Western Australia and Tasmania.

A wide range in sizes of ladders have pinus treads and hardwood sides. They are light and strong.

This bright modern plant contains some amazing woodworking machines which perform complex cutting work and dowelling work at high speed and in great volume. Some of the machines work at the rate of 4,000 revolutions a minute. There are several special machines designed by the manager, Mr. A. V. Pimlott.

An expanding lattice which can be folded to dimensions of only 52 in. x 22 in., but which expands to 12 ft. x 3 ft., is an ingenious and well-made product for use in gardens and the like. It is made of pinus slats ⅝ in. x ⅜ in.

Further mechanisation since the factory opened has increased the speed of production. Bathmats which used to take four minutes each to make can now be turned out at the rate of four gross in an hour.

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"Nu-Matic" is a Grinder with Many Uses

The claims made on behalf of the "Nu-Matic" grinder that it performs a wide variety of grinding, sanding and polishing operations at a minimum of labour, effort and overhead costs, are well substantiated by firms using it. It is a sturdily built machine and incorporates an ingeniously fitted pneumatic cushioned wheel which can be inflated or deflated to any degree of hardness required for any particular job. It possesses economical change-over for efficient and economy in productive operations.

This grinder is having a wide appeal to a diversity of industries and has already been well received in the metal trades, woodworking, automotive, pottery, tile, stone and general finishing industries as well as in tool and die shops. The unit has a big asset in that it can easily follow all sorts of contours as well as irregular and flat surfaces. In the motor trade it is being extensively used for polishing metal bodies, removing old paint and polish and panel welts. It is also in keen demand in the plastic trades, where its adaptability and speed are important parts of speedy output and production. It meets the requirements of furniture manufacturers for sanding chair and table legs of any design. In the metal trades, particularly in motor body building, it has many uses. A demonstration of the "Nu-Matic" showed how it can instantaneously and smoothly erase swirl marks and set up a highly polished surface.

The grinding surface is 3½ inches and is fitted on a 5 in. pneumatic drum. It can be inflated in a matter of seconds by the simple application of an ordinary bicycle pump or some other air inducing agency. But it has varied surface finishes which can be secured by using different r.p.m's. and various types of belts and grit and drum pressures. It is adaptable to a bench or can be used with a portable or flexible shaft power.

The unit is equipped with an adapter to fit ½-12 Whit thread power shaft, but other sizes are obtainable. It operates at 2,800 r.p.m. to reach 4,000 to 6,500 surface feet a minute, and all parts are easily assembled and replaceable.

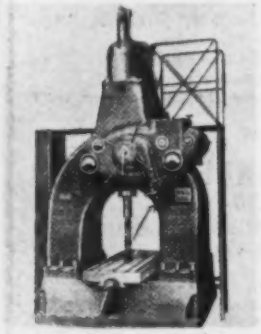
The "Nu-Matic" is made under licence from Nu-Matic Grinders Inc. of U.S.A., by Eliza Tinsley Pty. Ltd., 640-52 Bourke Street, Melbourne, and 465 Kent Street, Sydney.

YOU WANT TO KNOW . . . and the editors will gladly tell you . . . more about the inventions, materials, and processes mentioned on this page. Write to Box 1687, G.P.O., SYDNEY, enclosing a stamped, self-addressed envelope.

Twist Drill Testing Machine

The heavy-duty testing machine illustrated has been developed for carrying out performance tests on twist drills up to 3 in. dia. A series of holes is drilled in a material of known specification at set speeds and feeds until the increase in the amount of power consumed indicates that the drill has become blunt.

The portal-type structure which supports the driving motor, controls and drill spindle, has been specially designed to reduce the deflection due to drilling stresses. On test, the maximum deflection when using 40 h.p. was found to be 0.002 in. Column and base are fixed together by 12 studs, 1¼ in. in diameter.



Twist drills up to 3 in. dia. can be tested with this testing machine. Instruments are provided to indicate drill thrust, speed, feed rate and torque required. Automatic feed mechanism is incorporated for rates from ¾ to 60 in. per minute.

Machined from the solid, steel table has a working surface of 54 in. by 18 in. A handle fitted with a micrometer dial operates a leadscrew and nut to give 36 in. traverse. Table is mounted in V-slides machined in the heavy box-section cast iron base.

Spindle is 3¼ in. dia. in the driving portion. It is bored No. 6 Morse taper and runs in ball and roller bearings in the 9 in. dia. quill. Thrust is taken by a precision duplex bearing. Feed is transmitted by a rack with teeth of 2 DP, which is machined in the quill.

Drive is from a 40 h.p. slip ring motor, mounted vertically at the top rear of the machine. This drives directly to a gearbox, also on top of the machine, through two pairs of pick-off gears. Feed to the quill is obtained from a 2 h.p. 940 r.p.m. flange mounted motor, through two pairs of pick-off gears, a worm reduction gear, a rack and pinion and epicyclic reduction gears. Feeds available range from ¾ to 60 in. per minute. There are 209 different spindle speeds, provided by 26 pick-off gears. Fast or slow range of speeds is selected by a separate lever.

Spindle drive pick-off gears are made of nickel chrome steel, and are hardened and profile ground. Slipping clutches are incorporated both on the input and output side of the feed mechanism.

The machine is controlled by stop and start push-buttons which operate the spindle motor, feed motor and coolant pump motor independently. Hand feed by capstan handles is provided in addition to a slow hand feed by handwheel and an automatic feed. The automatic feed is engaged by movement of the capstan levers.

Starting, stopping and reversing of the automatic feed is controlled by a lever at the front of the machine. Reverse movement of the feed is used to back out the drill and also to relieve the pressure on the feed clutches before the automatic feed is disengaged. Automatic depth control is provided by stops fitted to a plate at the front of the machine.

The power consumed by the feed and spindle drive motors can be measured separately by two ammeters. These give a measure of the drill thrust and the torque being applied. Tachometers are fitted to indicate the spindle speed and feed rate.

Speed and feed change gearboxes are lubricated by oil pumps and the cascade system. Oil level and oil flow indicators are provided. Coolant is supplied by a pump mounted in a tank at the rear of the machine. A coolant trough is machined round the edge of the table and a large splash tray is provided. This tray also acts as a guard.

Electrical equipment is mounted in a separate panel at the side of the machine and is connected by cables below floor level.

Access to pick-off gearboxes is provided by a platform at the top of the machine, reached by a built-in steel ladder. Overall height is 11 ft. 1½ in. and weight is approximately 10 tons. [2659].

Efficient Melting Units for Non-Ferrous Metals

Incorporating many interesting features, two of which are low initial outlay and maintenance costs, a range of semi-rotary melting furnaces is being produced.

These furnaces have proved to be efficient and economical melting units for bronzes, gunmetal, copper, light alloy, etc. Fuel costs ar low, 24 gallons of fuel oil being used to melt and pour 1 ton of copper at 1,200 deg. C. One ton of gunmetal was melted and poured at 1,140 deg. C. with a furnace consumption of 20 gallons fuel oil, and 22 gallons were required to melt and pour at 730 deg. C. 1 ton of aluminium.

Monolithic type or high-grade standard firebricks are used for furnace lining, the lining life being from 250-300 heats. The installation of a new lining is simplified by the design of the furnace body. During melting, the furnace is rotated, bringing the heated lining underneath the bath of metal, which greatly accelerates melting times and prolongs the life of the lining.

Heating is provided by oil fuel burners or gas injectors. In the case of oil, this is supplied to the burners by gravity feed, the air required for combustion being provided by a motorized blowing fan. Close control of melting is obtainable. Air pressure gauges are fitted and electrical heating units are used for preheating the oil prior to it being fed to the burner. This gives good combustion conditions in the melting chamber.

Loading, exhaust, and pouring all take place at one orifice in the furnace body. Loading may take place at the back of the furnace and pouring from the front, by merely rotating the orifice to the appropriate position. Our illustration shows the furnace with open exhaust end, providing for poling and refining copper.

Furnace with open exhaust end, providing for poling and refining copper.

When casting for general foundry work, the metal is poured into suitable ladles. In the case of ingotting metal, pouring takes place direct into ingot moulds. This in-

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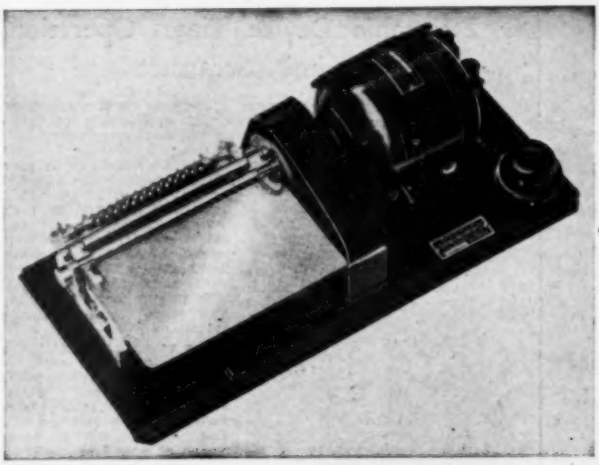

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The application of radium is by no means confined industrially to the metal trades, as some people may believe, and this is borne out by the following list of interesting applications:

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High density radiography capsules for internal examination of welds, valves, bearings, castings, etc.

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Furthermore, radium is available for research in the form of Neutron sources of radium-, polonium-, and radium "D"-beryllium: Alpha sources of polonium: Beta sources of radium "D" as well as bulk radium, polonium or radium "D."

All radium compounds and accessory equipment are available from our principals, Eldorado Mining & Refining (1944) Ltd., of Ottawa, Canada, and your enquiries will always be welcome.

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gotting system consists of a fabricated carriage, two strongly braced channels being mounted on wheels carried on ball-bearing plummer blocks. As many as thirty 28 lb. ingot moulds are mounted on the carriage at one time, the carriage being moved backwards and forwards by means of a chain-operated reduction drive. After casting, the moulds are tipped off the trolley, ejecting the ingot, and replaced for a second cast. This ingotting system enables the furnace to be emptied rapidly and provides a simple hand-operated method of ingotting at a low initial outlay.

The furnace is mounted as a complete unit, occupying a relatively small floor area comparative to the capacity of the furnace. The range of sizes in which the furnace is built is from 500 lb. to 5 ton capacity (brass), intermediate sizes being 1,000 lb., 1,500 lb., 1 ton, 2 ton, and 3 ton. [2658].

Electronic Device Times Operation, Limit, Sequence

A new, compact, electronic timer which provides automatic control of operation, limit, and sequence timing for industrial processes has been announced.

Electronic timer mounts on a conduit or flat surface. Two operations can be controlled on the same time schedule.

The new timer was designed to fulfil requirements for flexibility of application, accuracy and reliability in operation, low maintenance, and simplicity in servicing. It is available in three time ranges: 0.06 to 1.2 seconds, 0.6 to 12 seconds, and 6 to 120 seconds.

Some applications of the new device are: (1) operation timing to control duration of processes, (2) limit timing to stop conveyor belts, and (3) sequence timing with two or more timers in combination to control duration of operations.

The new timer features a detachable back plate which mounts directly on a rigid conduit or on any flat surface. Wires are brought to the back plate and pulled through, and the timer is then mounted on the plate by means of four screws. Wiring to the terminal board completes the installation. Space between the terminal board and the cover provides adequate room for all front-connected wiring, including that for the accessories. In addition, a dual set of contacts on the timer permit control of two operations on the same time schedule.

Mechanical wear is cut to a minimum with the electronic de-

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vice, engineers said, because the relay armature is the only moving part. The electronic tube in the timer is a standard model.

Life tests indicate that the new timer can perform a million or more operations at these controlled-load requirements, in-rush, 15 amp.; carry, 10 amp.; and break, 5 amp. As the controlled-load demand is reduced, more operations can be expected, it is stated. [2657].

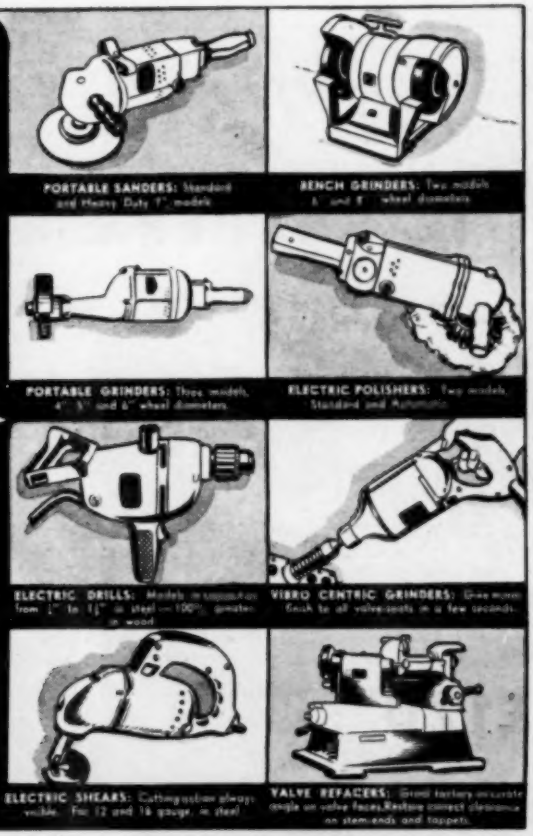
Drying at Controlled Temperatures

Precise air control has solved a moisture removal problem. Drying is an essential production step in many industries, but the equipment used, particularly if it is on a small scale, frequently suffers from drawbacks: sometimes the temperature is not uniform over the whole drying area, nor maintained constant within the variants; occasionally, fuel consumption is high, and uneconomical because of imperfect lagging; loading is often difficult, and maintenance long and cumbersome.

A new small-size drier, not marred by these defects, is conventional in that it electrically heats and then disseminates air; it is unusual in its method of air propagation, and in a number of other refinements.

The drier has overall dimensions of 7 ft. 6 in. by 5 ft. 1 in. by 4 ft. Air is blown by a fan, situated on the top of the device, through a special heater bank; it then passes into 32 separate ducts —the heart of the equipment. These ducts, which also act as carriers for the drying trays, virtually divide the main chamber into a series of small compartments. The hot dry air, emerging from numerous holes on the ducts' lower faces, as it were in layers, ensures uniform drying throughout. The air is exhausted through a floor grid, and 90 per cent. of it then mixed with fresh cold air for re-circulation. This guarantees fuel efficiency, which is further favoured by excellent lagging. Control, by thermostat, ranges from 20 deg. C. to 105 deg. C. ± 2 deg. C. Loading and unloading are facilitated by doors with an interlock switch, which cuts off current on opening. The heater bank is designed for easy removal. [2636].

"Van Dorn" Power means New Savings and More Profits to you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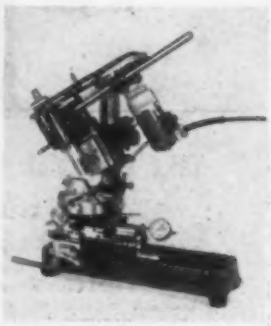
Small Heavy Duty Machine

The machine illustrated represents a novelty particularly remarkable by its nearly inexhaustible universality. This universal machine is of special use for the tool and gauge manufacturer, laboratories, workshops, etc., because it can be applied to nearly all working operations.

It consists of various basic elements which by means of a quick gripping mechanism can be composed to every machine tool type with only a few manipulations. This universality is attained by the new construction idea to give the workpieces as well as the tools any feed movement which at all ordinary machine tools is applied together. The machine is based on the principle that the workpiece during its manufacturing process should not be carried from one machine tool to the other, as hitherto usual, but to leave it in its first setting and to change only the operations of the machine itself, e.g., a blank manufactured by means of turning can be milled, bored, ground, teeth cut, etc., from all directions and without resetting, and it is of no importance whether this operation is carried out at an angle of 90 deg. or at any other angle. The working range of the machine complies with all proportions applied in light engineering. [2653].



Small Heavy Duty Machine.

Hotwire Vacuum Gauge

The increasing use of vacuum systems both in industry and research calls for very accurate measuring devices. Much present equipment, while admirable for accuracy and flexibility, has drawbacks such as bulkiness, and cable connections. These shortcomings may considerably lower efficiency if measurements must be made in rapid succession at various points of a vacuum system.

A gauge, combining the technical advantages of bulky apparatus with lightness and compactness, has now been produced. It works on the fact that variations in the pressure of a gas surrounding an electrically heated filament alter the gas' heat conductivity and consequently the filament's temperature. These changes in temperature can be converted electrically into a low-pressure measurement on a dial.

The gauge's vital component is the head gauge. Two types are made, both interchangeable, and both possessing an inbuilt calibration unit, which dispenses with the need for recalibration. Both have tungsten filaments working at 200 deg. C., a temperature which prevents damage in case of exposure to the atmosphere. One is designed for attachment to the vacuum system by a cone joint, the other to be soldered to a .5 in. (1.27cm) bore copper service tube. A highly sensitive leak detection system, based on hydrogen, is provided.

The instrument cabinet, supplied in two models, for either bench or panel mounting, is made, to ensure lightness, out of aluminium. It houses the meter, operational controls and batteries. A bantam power unit enables 200-250 volt., 50-60 cycle mains supply to be used, if needed. [2617].

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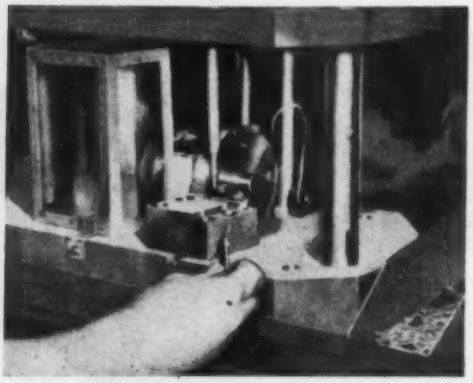

This standard work holding fixture has been developed to permit broaching various parts on any available horizontal or vertical broaching machine.

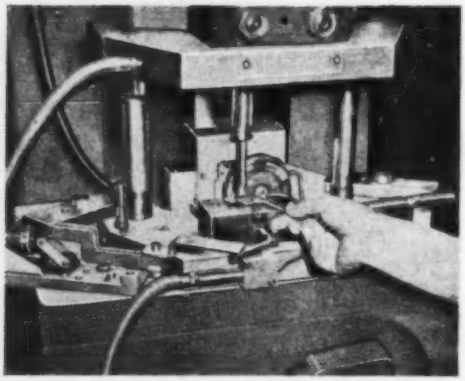

Fig. 2. Rotary broaching set-up. The broach is rotated intermittently by means of a rack-and-pinion and ratchet mechanism actuated by the reciprocating press ram.

Finishing Stampings by Rotary Broaching

Introduction of Economy to Small-Lot Production

ONE of the principal problems of a firm making business machines is the economical manufacture of high-quality parts in relatively small quantities. Many thousands of different components are required for the various types and sizes of accounting, statistic, time-recording, and document preparation machines. Since such elaborate machines are required only in limited quantities, and often must be designed to suit individual needs, the component parts are necessarily produced in small lots. This complicates production by necessitating frequent set-up changes.

To offset the normally high cost of small-lot production, full use is made of cost-reducing manufacturing machines and methods. One such method, widely employed at one company, is surface broaching. The advantages of surface broaching, such as rapid stock removal, low production cost per piece, high repetitive accuracy, and smooth surface finishes, have resulted in the adoption of this process by many industries for the mass-production machining of castings, forgings, and large parts. Broaching, however, can also be applied economically to the low-volume production of small, intricately-shaped parts or sheet-metal stampings.

Trimming or shaving operations on sheet-metal stampings which require a high degree of accuracy and smooth surface finishes can be eliminated by broaching. A standard work-holding fixture has been developed to permit broaching various parts on any of the available horizontal or vertical broaching machines. The small parts can be accurately broached in two or more planes and on several different surfaces in one setting. By combining operations and completing the part with one stroke of the broach, the cost of manufacturing is reduced. Sometimes the parts are of such a shape that they can be stacked for broaching several simultaneously. Rotary broaching is a new method of machining developed by the corporation's engineers which permits the machining of straight surfaces on sheet-metal stampings to close tolerances and with finishes better than those obtainable by conventional methods of shaving. This technique incorporates principles of both milling and broaching operations, making use of a revolving radial type of cutter, as in milling, and stepped teeth, as in broaching.

A group of rotary broaches is shown in Fig. 1. As can be seen, there are several identical sets of radially gashed teeth around the periphery of each broach, the sets being separated by non-cutting

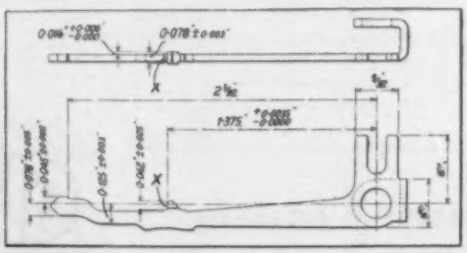

Fig. 3. The surface X of this ratchet type counter-clutch lever is machined to the limits indicated by means of the rotary broaching set-up in Fig. 4.

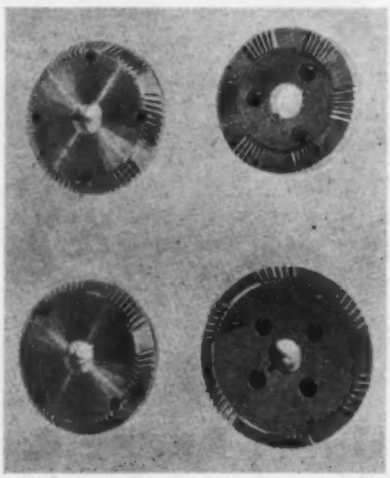

Fig. 1. Rotary broaches used to machine straight surfaces on sheet-metal stampings to close limits and with smooth finishes.

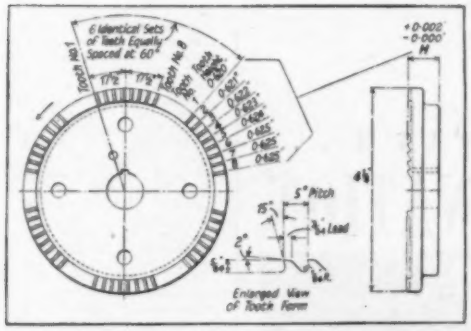

Fig. 5. Details of the rotary broach used with the fixture seen in Fig. 4, to machine a latch surface on the counter-clutch lever, Fig. 3.

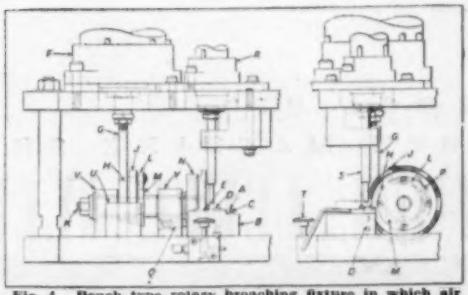

Fig. 4. Bench type rotary broaching fixture in which air cylinders are employed to clamp the work-piece and actuate the mechanism whereby the broach is rotated intermittently.

gaps. Each part is completely broached by one set of teeth in a partial revolution of the cutter. A brief time interval, or dwell, is provided between broaching strokes during which the completed part is ejected by semi-automatic or automatic means, and the work-holding fixture is reloaded. Since an unbroached surface is presented to each successive set of teeth, the broach does not have to be returned to its starting position or relocated. Idle time between cuts is thus kept to the minimum.

In rotary broaching, the amount of stock to be removed from each part ranges from about 0.005 to 0.008 in. Since each tooth removes only from 0.0005 to 0.002 in. of stock, the total tool life and the life between sharpenings are relatively long in relation to the finish and accuracy obtained. The last few teeth in each set are generally made of the same height. These teeth remove no metal, but perform a burnishing or cold-working sizing operation which smooths out any fine surface irregularities on the work.

By ensuring the proper shearing action, the formation of burrs is minimized. The tooth form is essentially the same as that of a conventional broach. Shear is varied to suit the part to be broached, additional shear being obtained by setting the part so that the surface to be broached is above or below the centre of the tool.

A high degree of accuracy can be achieved consistently, and the relation between various surfaces on the part can be maintained within close limits. Tolerances of 0.001 in. are frequently specified on surfaces which are to be rotary broached. Surface finishes as smooth as 8 micro-inches r.m.s. have been produced on sheet-metal parts by rotary broaching, and finishes of 16 micro-inches maximum are consistently obtained in production.

The fixtures employed for rotary broaching are simple and inexpensive. The broach is rotated intermittently by means of a rack and pinion ratchet mechanism which is actuated either by the reciprocating ram of the press, Fig. 2, or a pneumatic or hydraulic cylinder. Since the main force of the broaching cut is downwards, pressing the workpiece against the base of the fixture, only light clamping pressures are required.

An air-actuated, bench-type rotary broaching fixture, shown in the heading illustration, is employed to machine the latch surface X of the sheet-metal stamping seen in Fig. 3. The part, a ratchet-type counter-clutch lever for an electric, punched-card accounting machine, is made from cold-rolled carbon steel, and is copper-plated all over before machining. The tolerances which must be maintained are indicated on the drawing. The surface X must be parallel with the centre lines of the holes in the part within 0.001 in. Corners on the latch must be finished smooth, with a maximum radius of 0.003 in., and a surface finish of 16 micro-inches r.m.s is specified for this component.

As shown in Fig. 4, the workpiece A is placed on a locating block B, with the lower hole over the pilot-pin C. A flat spring D, screwed to the front of the locating block, clamps the workpiece against the stop-pin E. The air cylinder F, actuated by a foot-valve beneath the bench on which the fixtures are mounted, forces the rack G downwards, thus rotating the pinion H one-sixth of a revolution. The pinion H and the lever J, to which it is dowelled, are freely mounted on the shaft K. The pawl L, which is pinned to the lever, rotates the ratchet wheel M. The ratchet wheel, broach holder N, and rotary broach are all keyed to the shaft K, and are therefore rotated one-sixth of a revolution for each downward stroke of the rack.

On the up stroke of the rack, the ratchet wheel, broach-holder, and broach remain stationary while the pinion and lever rotate in the opposite direction, returning to their original positions. The pawl falls into the next notch on the periphery of the ratchet wheel in readiness for the work cycle to be repeated. The spring P, hooked over studs in the pawl and lever, keeps the pawl in contact with the ratchet wheel. A spring-loaded detent Q progressively enters each of six holes provided in the rear face of the broach-holder to prevent the broach from rotating during the up-stroke of the rack or while the next part to be broached is being loaded.

The air cylinder R, actuated at the same time as the cylinder F, forces the ram S downwards to clamp the workpiece against block B during the broaching operation. When the rack and clamping ram have been raised, the hand-knob T is depressed, thus releasing a blast of air which lifts the broached part from the pin C and blows it out at the back of the fixture. The slotted block U serves as a rack guide, and bearing blocks V support the shaft, pinion, lever, ratchet wheel, broach-holder, and rotary broach. The same fixture can be employed for broaching the other parts by merely changing the broach and broach-holder and substituting a suitable locating block B.

A detail drawing of the broach is shown in Fig. 5. The tool is made from high-speed steel, heat-treated to a hardness of from 64 to 66 Rockwell C, and ground. Six sets of cutting teeth are provided, each of which comprises eight teeth. Thus six workpieces are finished for each revolution of the broach.

Cutting teeth on the rotary broaches are gashed radially or at a shear angle to the centre of the tool. The teeth are ground to the H dimensions given on the drawing, and the last three teeth in each set are of the same height. After sharpening, shims are introduced between the broach and the broach-holder to maintain the heights.

Since each of the cutting teeth removes only about 0.001 in. of stock (with the exception of the last two teeth, which remove none), there is very little wear on the tool. The life of one of these cutters is estimated to be about 1,000,000 pieces, and as many as 50,000 to 60,000 levers are broached before sharpening of the teeth is necessary. The number of parts broached between grinds could be increased by using a carbide inserted-tooth broach.

Additional stock can be removed by decreasing the number of sets of teeth in the broach and increasing the number of teeth per set, or by increasing the diameter of the broach and increasing the number of teeth per set. In either

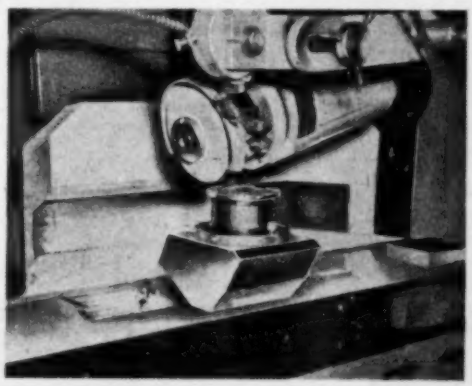

Fig. 6. Grinding set-up for sharpening the teeth of rotary broaches. The base of the indexing fixture has angles on which it rests when the various surfaces on the broach teeth are being ground.

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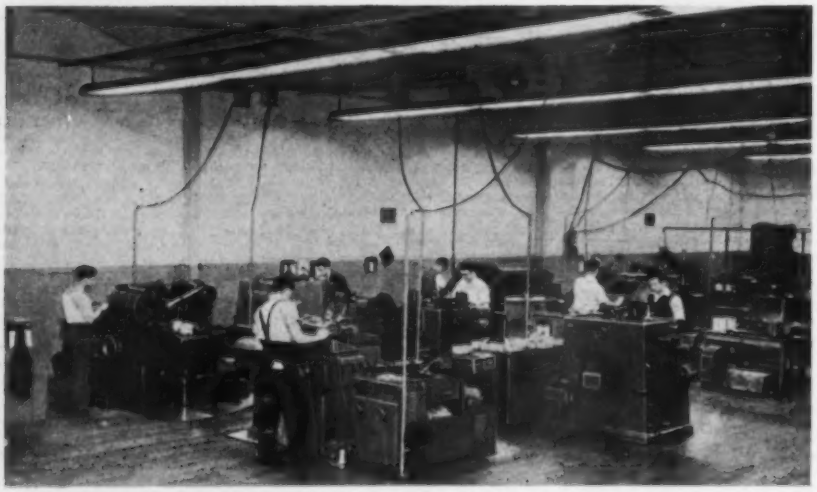

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case, a longer stroke of the press ram or air-cylinder piston is required. To broach more than one surface on a part at a time, several broaches can be mounted on the same shaft.

Rotary-type broaches are sharpened with standard broach-sharpening equipment. A special fixture, Fig. 6, is used to hold the cutter and to index it from tooth to tooth. For shaping or gashing the tooth form, a 60-grit, grade J, aluminium-oxide wheel is used, while a 320-grit silicon-carbide wheel of the same grade is employed to finish-form the contour of the tooth gash.

The stepping of the teeth is produced with a flared cup aluminium-oxide wheel of 46 grit and grade K. Finally the cutting edges are finish-ground with a grade J silicon-carbide wheel of 320 grit with shellac bond.

Parts similar to the ratchet-type counter-clutch lever illustrated are finished by rotary broaching at the rate of approximately 425 per hour, compared with 70 per hour for lapping. Production obtained from rotary broaches now in use at this plant ranges from 400 to 1,500 pieces per hour, depending upon the ease with which loading and unloading can be carried out.

After Business Hours

(Continued from page 2.)

tion was by Peter Brook. The great British actor, John Gielgud, was at his best as Angelo. He was making his first appearance at Stratford. I had the pleasure of seeing a new star born in the person of Barbara Jeffora, who played Isabella. Harry Andrews was a noble Duke, but unfortunately his voice is still affected by some throat trouble he contracted while touring Australia with the Stratford players.

It was a very exciting first night, culminating in a reception in the theatre after the show. As well as the cast, there were many outstanding celebrities to stare at, Anthony Quayle, Diana Wynyard, Tyrone Guthrie, Marie Ney, Daphne Rye and many, many others. There was a lot of talk about Australia and the impression gathered was that the touring company had enjoyed itself immensely. They were very satisfied with the reception they had received everywhere and they were very satisfied with the steaks they had eaten.

At the time of the opening there was only one Australian in the company. This was Tony Riddell, who is one of the two stage managers. Even after an arduous first night, he was still prepared to sing loudly the praises of Stratford-on-Avon and the Stratford players. Since then another Australian has come well into his own with the presentation of Julius Caesar. This is Warwick Armstrong, of Melbourne, who has gained success with his designs for the special settings and costumes.

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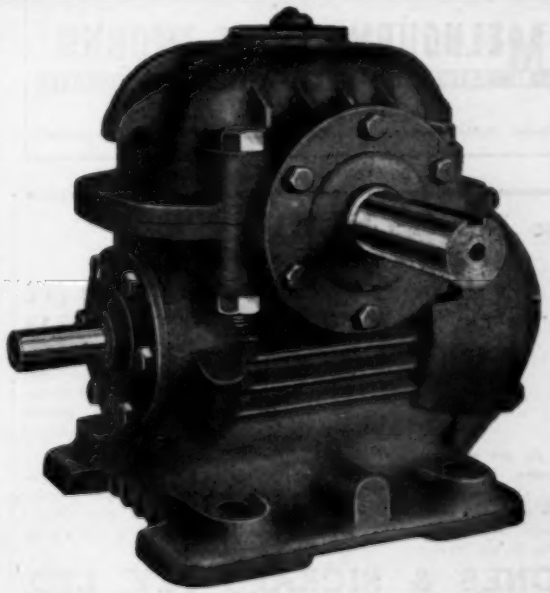

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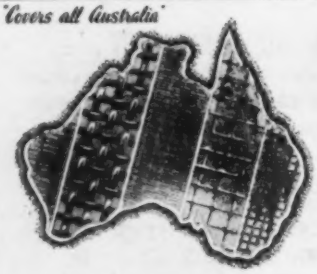

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The proprietor of a cafe at Hall's Gap, Victoria, wrote to K. Bowes & Co. Ltd., Woodlands Park, S.A., as follows:—"On page 6 of a booklet you issue with each KBC 32 volt. food mixer, you state: 'Service—Spare parts readily available from the manufacturers.' Well, just three weeks after buying the mixer for my wife I dropped and broke the large mixing bowl. I presume that you are a married man and can readily understand what I have gone through since the accident.

"From the spate of words emanating from my better half, I gather there are two courses of action open to me—

(a) To have my ruddy head examined to discover if I am "all there', or

(b) to try to buy a new bowl, without which the mixer is useless.

"I am, therefore, following course (b) first, hence this letter to you. If no bowls are available, I must reluctantly follow course (a).

"Won't you please help me by forwarding one large mixing bowl to the above address? My cheque for same will be returned immediately."

The reply by the Managing Director (Mr. Ken Bowes) was:—"We are in receipt of your letter and note your dilemma. As the statement on page 6 of our booklet states 'the truth, the whole truth and nothing but the truth', we hasten to prevent you from following course (a) as set out in your letter by sending you one large bowl for your K.B.C. food mixer, as quickly as possible.

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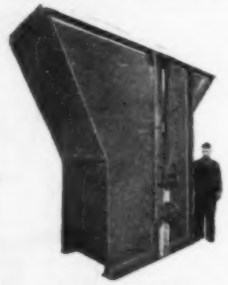

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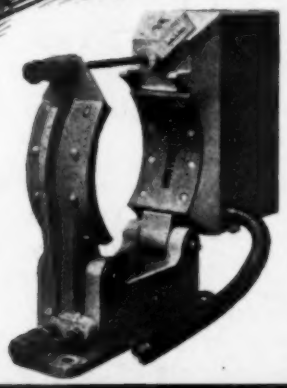

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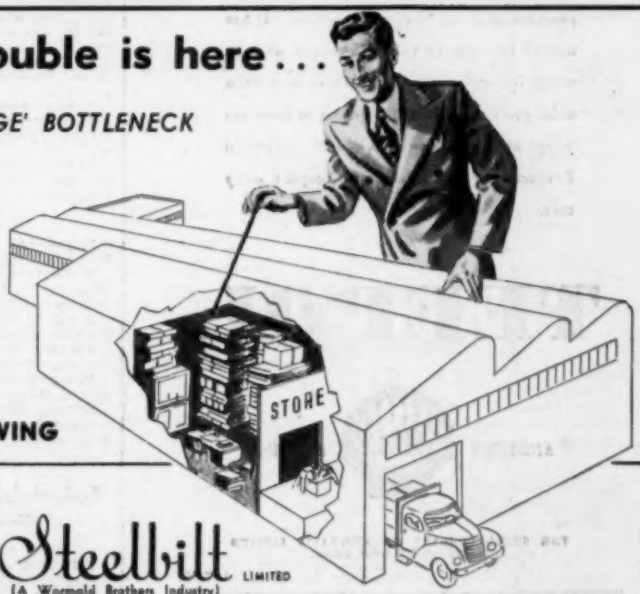

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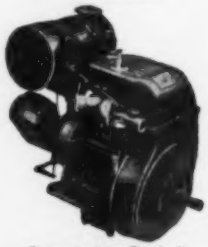

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turers of electrical goods and products. Subscribers: Norman J. Hepburn and Brian M. Scanlon. Registered Office: Sydney. (Lodged by B. Scanlon, 66 Edenholme Road, Five Dock.)

DURAGLAZE INDUSTRIES (N.S.W.) PTY. LTD.—Capital: £9,500. Sprays' manufacturer. Subscribers: Geoffrey B. Ward and Peter O. Miller. Registered Office: 133 Pitt Street, Sydney.

ENMORE FIBRE & CORRUGATED CONTAINERS PTY. LTD.—Capital: £25,000. Manufacturers of containers of all kinds. Subscribers: Frederick R. Hudson and Noel I. Hudson. Registered Office: 35 Cowper Street, Marrickville.

FREEZMASTER REFRIGERATION PTY. LTD.—Capital: £10,000. Refrigeration equipment manufacturer. Subscribers: Raymond F. Carroll, William V. N. Parker, Wallace J. A. Carroll, Jeffrey W. S. Larkin and Janet E. Larkin. Registered Office: Gladesville. (Lodged by F. W. Hall & Edgington, 77 King Street, Sydney.)

LOVELOCK, GEORGE PTY. LTD.—Capital: £10,000. Cabinet manufacturers. Subscribers: Donald E. Rollason and Benedict M. Kenny. Registered Office: Sydney. (Lodged by B. M. Kenny & Co., 14 Spring Street, Sydney.)

MACKEY & ROBERTS PTY. LTD.—Capital: £10,000. Machinery manufacturers. Subscribers: Hector J. R. Clayton and Andrew M. Clayton. Registered Office: Sydney. (Lodged by Clayton, Utz & Co., Liverpool Street, Sydney.)

MASON - KOLOK MANUFACTURING CO. LTD.—Capital: £150,000. Manufacturers of chemicals, chemical products, office stationery, etc. Subscribers: Norman L. Cowper, William R. D. Stevenson, Roy E. West, Edward J. Culey, Alan H. Loxton, Gabriel S. Reichenbach and Charles F. Bickford. Registered Office: 593-5 Gardeners Road, Mascot.

SUSSEX MANUFACTURING CO. PTY. LTD.—Capital: £20,000. Trophy and fancy goods manufacturer. Subscribers: Emanuel Gilovitz and Andrew G. Baloph. Registered Office: Sydney. (Lodged by Charles A. Morgan, Potts & Cullen, 9 Martin Place, Sydney.)

BIG SHARE ISSUE TO AUSTRALASIAN PAPER AND PULP EMPLOYEES.

Sir Norman Brookes, chairman, announced at the recent annual meeting of Australasian Paper and Pulp Co. Ltd., that a further 100,000 shares had been made available to the employees of the operating company on terms similar to those recently issued to shareholders. He also informed the meeting that the directors are whole-heartedly behind the vast expansion programme of the company.

This granting to employees of a genuine stake in the enterprise in which they are working is assuredly one of the finest means of building up that management-employee co-partnership on which the progress and prosperity of industry ultimately depend.

Fly Canadian Pacific
ACROSS THE PACIFIC
the Colourful Comfort Way!

Dancing under the stars at famous Moana Hotel, Honolulu, where you stay as Canadian Pacific's guest.

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For further details, apply Canadian Pacific Railway Company, or Union Steam Ship Co. (General Agents), 247 George Street, Sydney, and 59 William Street, Melbourne, or any authorised Tourist Agency.

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INQUIRIES FOR PLANT MATERIAL AND AGENCIES

THE AUSTRALASIAN MANUFACTURER'S INQUIRY DEPARTMENT

This Inquiry Service is for the use of readers of "The Australasian Manufacturer" who wish to trace suppliers of Plant, Equipment and Materials, and for particulars of agencies offered. Address your inquiry to the Inquiry Department, and give the fullest possible particulars to enable us to put you in touch with the best sources of supply. INCLUDE A STAMPED SELF-ADDRESSED ENVELOPE WITH YOUR INQUIRY. It is essential that telephone Inquiries be confirmed by letter. No charge is made for Inquiry Services, but normal advertising rates will be charged if agencies are sought by manufacturers' representatives or if goods are offered for sale. For the benefit of new subscribers, inquiries will be published in two or more consecutive issues.

SPECIAL NEW INQUIRIES.

WHEN REPLYING to an Inquiry, please quote the Reference Number and send your reply to the Inquiry Department, "The Australasian Manufacturer," 16 Bond Street, Sydney. **INCLUDE A PLAIN, STAMPED ENVELOPE** so that we can forward your reply to the Inquirer.

CAPSTAN LATHE CAPACITY AVAILABLE: Melbourne firm has capacity available on capstan lathe up to 1¼ in. Write to Ref. 8332, c/o "The Australasian Manufacturer."

• • • •

TASMANIAN AGENCY.—"THE AUSTRALASIAN MANUFACTURER": The publishers of this Journal desire to appoint an advertising and subscription Agent in Tasmania. Remuneration will be on a commission basis. Full details on application to Ref. 8333, c/o "The Australasian Manufacturer."

• • • •

HEAVY DUTY CROPPING SHEARS: Adelaide firm wants to purchase a heavy duty cropping shear suitable for cutting scrap steel for use in foundry cupola. Write to Ref. 8334, c/o "The Australasian Manufacturer."

DIESEL ENGINE:—150 - H.P., Twin Vertical "Petters", 330-R.P.M. Can be inspected, running. First-class order. Write to Ref. 6577, c/o "The Australasian Manufacturer."

WANTED, ENGINEERING BUSINESS: General Engineering business with good equipment in Melbourne or Suburbs. Short lease premises no objection, as advertiser will have new factory available next year. Possible partnership or employment of existing owners considered. Fullest particulars of lines handled, equipment, premises and past financial records, in strict confidence to:—"Engineer", c/o "The Australasian Manufacturer", 197 King Street, Melbourne.

HOSPITAL EQUIPMENT — MANUFACTURING OPPORTUNITY: An American Company specialising in the manufacture of certain types of hospital equipment, particularly resuscitators, is interested in the possibility of a licensing arrangement with an Australian firm, whereby its trademark and patents would be used in similar equipment manufactured and distributed in Australia. Firms interested in this inquiry, write to Ref. 8335, c/o "The Australasian Manufacturer."

• • • •

PAPER CONVERTING FACTORY — PARTNERSHIP DESIRED: A South African Paper Processing Company is desirous of establishing a factory in Australia for the manufacture of serviettes, facial tissues, toilet rolls, d'oyleys and crepe paper, etc., and is interested in partnership or other form of business association with a similar existing establishment in this country. Write to Ref. 8336, c/o "The Australasian Manufacturer."

CEMENT BRICK MAKING MACHINES: Firms manufacturing automatic brick making machines —preferably electric power—to produce 5,000-6,000 standard cement bricks daily, are requested to write to Ref. 8328, c/o "The Australasian Manufacturer."

• • • •

WATER TAPS AND TOOL-POST LATHES: Firms who are interested in the manufacture, under licence, of a patented two-piece water tap, and/or a tool-post for lathes, said to excel existing types, are invited to write to Ref. No. 8312, c/o "The Australasian Manufacturer."

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J. NORRIS & CO.
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"Tap with a finger tip"
ASPERA AUTOTAP
AUTOMATIC CYCLE — LEAVES HANDS FREE
No Skill Required
PERFECT THREADS IN THIN AND SOFT MATERIALS
No Breakages
Adaptable also to Portable Tools
High Production —— Low Capital Investment
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15 O'Connell Street, Sydney. BW 7431.

PASSIONFRUIT PULP — EXTRACTION MACHINE WANTED: Makers of machines for extracting Passionfruit Pulp are asked to write to Ref. No. 8327, c/o "The Australasian Manufacturer." We understand that this machine consists of a vacuum pump and a container with a suitable nozzle, against which the halves of the Passion Fruit are placed, and the pulp is then extracted into the container in which a vacuum is maintained by a small pump.

SPRING WIRE: N.S.W. Company wishes to obtain large or small quantities of 16 or 17 gauge super or standard Spring Wire, bright or galvanised. Write to Ref. 8326, c/o "The Australasian Manufacturer."

• • • •

WALL AND FLOOR TILES: New Companies manufacturing Wall and Floor tiles are requested to write to Ref. 8331, c/o "The Australasian Manufacturer."

PLASTIC MOULDINGS, DIES AND AUTO. LATHE CAPACITY
Specialists in Electrical and Industrial Mouldings. Prompt Service.
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56 KW Bell Type Electric Furnace with double base. Internal measurements approximately 6ft. by 4ft. by 4ft. For inspection and further particulars, apply: LINDBERG FOSTER DISPLAYS PTY. LTD., 849 Church Street, RICHMOND, VIC. 'Phones: JB 1534-5.

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Completely Modern Continuous Furnace with Capacity Available for Sheet Metal Enamelling

Continuous Basis Preferred

W. T. CARMICHAEL LIMITED

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BOILER FEED PUMP AND HYDRAULIC PRESS FOR SALE: Sydney firm has for sale a Boiler Feed pump, 7½ h.p. motor, 500-600 g.p.m., at 150 lbs. p.s.i. Compact, well constructed unit. Had little use. Also all steel welded 25 ton hydraulic press, 15 in. stroke, 15 in. opening, complete with fittings. Reply Ref. 8329, c/o "The Australasian Manufacturer."

• • • •

EQUIPMENT FOR BONDING PROCESS: An American Company claiming to be exclusive manufacturers of equipment for a new impregnating process for sealing micro-porosity in non-ferrous castings designed for pressure tight applications, seeks a mutually satisfactory arrangement with an Australian firm regarding development of the process in this country. If interested, write to Ref. No. 8314, c/o "The Austfalasian Manufacturer."

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STURDY
PRESSED STEEL
CONSTRUCTION

PROMPT DELIVERIES

Manufactured and Distributed by

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LEICHHARDT, N.S.W.
Telephone: LM 1617

ALUMINIUM AND BRONZE METAL POWDERS—PRODUCTION IN AUSTRALIA: Having disposed of their interest in an English Company which manufactured aluminium and bronze metal powders, the former Works Manager, who was also a Director, along with another shareholder, are desirous of transferring some of their own machines to Australia and manufacturing these powders in this country. They are interested in partnership or other form of business association with a similar existing establishment in this country. Firms interested in this proposition write to Ref. 8330, c/o "The Australasian Manufacturer."

• • • •

ELECTRIC MOTORS: Tasmanian manufacturer desires to purchase supplies of 1 H.P., 3-Phase (totally enclosed) Electric Motors, for equipping new machines. Quotations invited, together with prints, giving dimensions, total weight, and delivery position to Ref. 8321, c/o "The Australasian Manufacturer."

• • • •

MANUFACTURE OF COOL CHEST: Designer of an electrically powered air cool chest Patent No. 38,660/50, desires to contact anyone who might be interested in the commercial manufacture of such patent. Write to Ref. 8322, c/o "The Australasian Manufacturer."

• • • •

HIGH PRESSURE PUMPS: W.A. firm wishes to contact a manufacturer of small high pressure pumps, suitable for pumping agricultural sprays, such as the "Bordeaux". Write Ref. 8323, c/o "The Australasian Manufacturer."

• • • •

AGENTS WANTED FOR ELECTRIC HOISTS: The manufacturers of a well-known range of electric hoists wishes to appoint active agents in Victoria, Tasmania and Newcastle. Write to Ref. 8324, c/o "The Australasian Manufacturer."

• • • •

RUBBER TECHNOLOGIST. POSITION WANTED: Qualified English Technologist with 20 years' experience general rubber goods manufacture. Formerly chief chemist two leading companies. At present resident N.Z., but arriving Australia early 1951. Write to Ref. 8325, c/o "The Australasian Manufacturer."

GARFIELD AUTOMATIC NUT TAPPERS

No. 0
Auto. Tapper
Capacity ¼" - ⅞"

Production (approx.)
¼" 4,900 Per Hour
⅞" 4,000 Per Hour

No. 1
Auto. Tapper
Capacity ⅛" - ⅝"

Production (approx.)
¼" 3,000 Per Hour
⅝" 2,600 Per Hour

Manufactured by
GEO. H. ALEXANDER MACHINERY LTD.
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Factory Representatives for Australia and New Zealand

LEO ROGALY AND LEWIS
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MADE IN GERMANY

This industrial roller chain is produced to precision engineering standards in all required types and sizes. It is of robust construction and particularly recommended for efficient operation where heavy duty conditions are encountered and maximum strength is essential.

AVAILABLE FOR EARLY DELIVERY — INDENT ONLY

SIMPLEX
DUPLEX
TRIPLEX

Motor Cycle Chain Also Available

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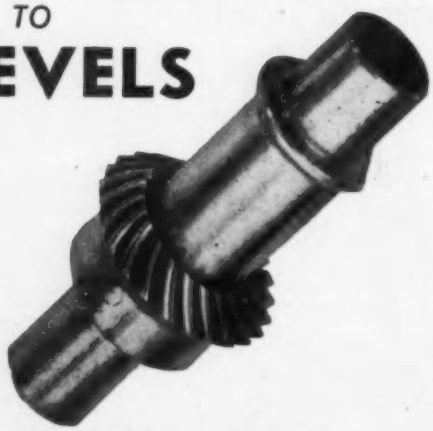
HAVING TROUBLE WITH BEVEL GEARS?

THEN CHANGE TO

SPIRAL BEVELS



Only SPIRALS have these advantages:

- As many as 5 teeth always in mesh, giving smooth, quiet action, and also
- reduces working load on tooth.
- Localised tooth bearing, allowing greater tolerance in assembly.
- Curved teeth keep lubricants between mating surfaces.
- The 20° long-addendum tooth form prevents interference when the pinion has as few as 6 teeth.

Capacity for SPUR and CLUSTER GEARS to 8in. diam. done by the FELLOWS METHOD.

REMEMBER! These gears actually COST NO MORE than straight bevels.

RANGE: $\frac{1}{16}$in. to 3$\frac{1}{2}$in. diam. 12 D.P. to 50 D.P. 12-teeth pinions to 100-teeth crown wheels.

G. L. SHERATON

MANUFACTURING AND GENERAL ENGINEER.

445 HEIDELBERG ROAD, FAIRFIELD, N.20, VICTORIA

TELEPHONE: JW 4752.

NEW MEMBERS.

SOUTH AUSTRALIAN CHAMBER OF MANUFACTURES.

The following were recently elected members of the S.A. Chamber:—

Acme Joinery Co. Ltd., 32 William Street, Croydon—Carpenters and joiners.

Cudmore Park Cement Products, 1 Ferry Street, Cudmore Park—Cement products.

Diesel Motors, Lorne Street, Adelaide — Diesel engineering (heavy transport).

Gallagher Bros., cnr. Port and Woodville Roads, Woodville—Engineers (manufacturing).

Miss A. Hambour, Liberal Club Buildings, 175 North Terrace, Adelaide—Dressmaking.

Hindmarsh Engineering Co. Ltd., 15 Manton Street, Hindmarsh—Engineering.

Hoadleys Chocolates (S.A.) Ltd., 63 Carrington Street, Adelaide—Confectionery manufacturers.

Walter Ludgate, 33 Angas Street, Adelaide—Clothing manufacturer.

CHEMICAL INDUSTRY DIRECTORY.

The great growth of the Australian Chemical Industry since before World War II is shown in the Second Edition of the Directory of Australian Chemicals, just published by the Division of Industrial Development of the Commonwealth Ministry of National Development.

Since before the war, the number employed in the industry, including that section making explosives, has increased by 80 per cent., while the number of factories has increased by 63 per cent.

The figures are:

	Employees.		Factories
June, 1939	8,100	....	250
June, 1949	14,611	....	408

In the first edition of the Directory, published in 1948, 585 chemicals and 180 manufacturers were listed. Sixty-three of those chemicals are not now made in Australia. However, 190 new chemicals are now being manufactured, so that there are 712 chemicals and 188 manufacturers in the second edition.

The Directory of Australian Chemicals is designed to promote the use of the industry's products and help manufacturing activities. Every manufacturer or industrialist who is constantly using chemicals in the factory, or the person who is contemplating the establishment of a plant in Australia, should have a copy. It is priced at 7/6 and may be obtained from the Division of Industrial Development, 203 Collins Street, Melbourne.

SPECIAL NOTICE TO READERS
To receive prompt attention, address all inquiries to Box 1687, G.P.O., Sydney.

There is no substitute for a forging. Ever since man first worked metal he has known that only forgings fully develop metal quality. The pride of craftsmanship of the smith is kept alive today in the technical modern productions at A.F.E.

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The Engineered Process for Mechanical Finishing and Deburring

Roto Finish is a production process for deburring and finishing parts employing a controlled rotary action with special mineral chips and compounds. Roto Finish is entirely mechanical — eliminates tedious manual operations — handles parts in bulk loads and requires no skilled labour.

ECONOMY.—One operator handling several machines may replace a score of skilled employees using deburring tools, files, belts and wheels.

PRODUCTION.—Roto Finish speeds up production deburring and finishing operations — large quantities of parts are processed in one operation in a fraction of the time required by manual methods.

TAKE ADVANTAGE OF OUR FREE SAMPLE PROCESSING

A. FLAVELL PTY. LTD.

283 Hoddle Street, Collingwood, Victoria

AUSTRALASIAN LICENSEES STURGIS PRODUCTS CO., STURGIS, MICHIGAN, U.S.A.

ECONOMICAL STRIPPING OF PIRNS

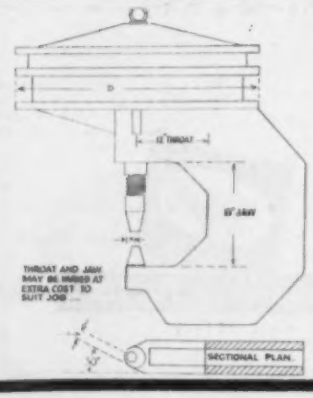
Textile research workers have solved the problem of handling automatic pirns with maximum speed and economy. Unless a relatively expensive, fully automatic machine is available, the services of skilled workers are essential for the process of stripping the residual bunch of weft from automatic loom pirns; the manual method is, of course, much slower.

A British firm has developed a machine which gives increased efficiency by reducing labour and operational costs. For a fraction of the cost of a completely automatic machine, this simple power-driven unit has "out-stripped" the performance of three skilled hands engaged full-time on the work of pirn-stripping. The services of only one unskilled attendant are required to maintain the supply of pirns and the machine rapidly removes unused weft by overend withdrawal, without any risk whatever to the pirn stems.

In practice, the machine works very simply. The operator is merely required to drop the pirns on to vertical spindles and to throw the loose ends of weft over the revolving swift which rapidly takes up the yarn from the pirns. When the swift becomes conveniently loaded with yarn, it is quickly stripped by the operator, simply by a lengthwise cut with scissors, and the waste material is suitable for various subsidiary purposes, the making of mops, dusters, etc.

The machine is sturdily built, and owing to its small size can be easily moved about when required. There are no mechanical intricacies, so that continuous trouble - free working is assured.

DO YOU USE OUR INQUIRY DEPARTMENT
SEE PAGE 40



NEVANDER SERIES L PNEUMATIC SQUEEZE RIVETERS

NEVANDER series L pneumatic SQUEEZE RIVETERS have a powerful diaphragm mounted on the end of the riveting mandrel, so that the rivet is closed by a direct pneumatic squeeze; silent and certain in action; no high pressure hydraulic or hydro-pneumatic system is required in these simple machines.

These riveters may be suspended in any position, or supported from a stand, and the only connection required is an air hose to the factory air supply.

There is no hammering action; no noisy percussion; no trembling of the work; and, most important of all, no uncertainty as to the result. The foreman, in effect, pre-selects and sets the result by means of the adjustable regulator and gauge provided.

These powerful riveters give a direct pneumatic squeeze without the necessity of toggle mechanisms to boost the pressure; hence the PRECISION obtainable by simple adjustment of air pressure.

Type.	L-23	L-46	L-812	L-1624
Rating	1/8in.	3/16in.	1in.	5/8in.
Air, p.s.i.	100	100	100	120
Tons	2-3	4-6	8-12	16-24
Stroke	5/16in.	11/16in.	1 1/4in.	2 5/8in.
"D"	14in.	14in.	24in.	32in.
"B" Min.	1in.	2 1/8in.	1in.	1in.
"A" std.	5/8in.	1in.	5/8in.	1 1/8in.
"A" Min.	1in.	5/8in.	5/8in.	1in.

In this table, stroke is the power stroke, which is additional to the hand screw adjustment of 3/4 inches. The dimensions "A" std. are with standard rivet sets and anvils and the dimensions "A" min. are the minimum available and are obtained by using offset rivet sets and anvils. The dimensions "B" min. are the minimums when the riveter is tilted 30 degrees when using offset rivet sets and anvils. The dimensions "A" min. and "B" min. are such that these riveters will handle most close-up rivets.

The rating given in the table is the maximum shank diameter for cold dead soft steel rivets when closed one at a time; when several rivets are closed simultaneously, the shank area may total about that corresponding to the maximum shank diameter.

This area rule may be used for determining the size and number of tubulars or eyelets which can be closed. For rivets of other than cold dead soft steel, the rating varies with the compression strength.

A product of

THE POWER ELEMENT CO.

Box 7, P.O., Edgecliff, N.S.W., Australia

TARIFF INQUIRIES.

The Minister for Trade and Customs has referred six new matters to the Tariff Board for inquiry and report in accordance with the Tariff Board Act, 1921-1950:—

(1) Record Changing Devices: (The reference previously received on this subject and notified in Tariff Board Circular 50/22 of 12th September, 1950, has been withdrawn and the following new reference received): What rates of duty should be imposed on record changing devices, unassembled or assembled, with or without motor pick-up arm magnetic pick-up volume control mounting plate and turntable, imported separately, for use in gramophones, phonographs and other talking machines, imported into the Commonwealth of Australia. (2) Strychnine and Strychnine Salts: What is the maximum quantity of—(a) Strychnine, and (b) Strychnine Salts, that should be contained in any individual container to permit, for Tariff purposes, of such goods being classified for retail sale. (3) Chain Pulley Blocks: What rates of duty should be imposed on chain pulley blocks imported into the Commonwealth of Australia. (4) Rubber Chemicals: What rates of duty should be imposed on—Phenyl B-Napthylamine, Mercaptobenzthiazole, Mercaptobenzthiazole di Sulphide, imported into the Commonwealth of Australia. (5) Controlling Apparatus: What rates of duty should be imposed on apparatus for controlling the speed of sewing machines imported into the Commonwealth of Australia. (6) Catches for Ladies' Handbags and Wallets: What rates of duty should be imposed on catches for ladies' handbags and wallets, imported into the Commonwealth of Australia.

These matters will form the subjects of public inquiries at a later date.

NEW SYSTEM OF LOW-COST 'PHONE NETWORKS.

A great deal of attention is given in Swedish technical circles to a new system of telphone networks extensions for urban areas worked out by Mr. Yngve Rapp, engineer of the L. M. Ericsson telephone manufacturing concern, who revealed a new set of formulae in a doctoral thesis, "The Economic Optimum in Urban Telephone Network Problems", presented on October 15 at Stockholm's Royal Institute of Technology.

The event was attended by a large number of Scandinavian telephone experts who emphasise that application of the new principles may have far-reaching consequences by saving billions in network construction which, from an economic-technical point of view, at present is relatively behind in development compared

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Open-fronted Presses will give you—

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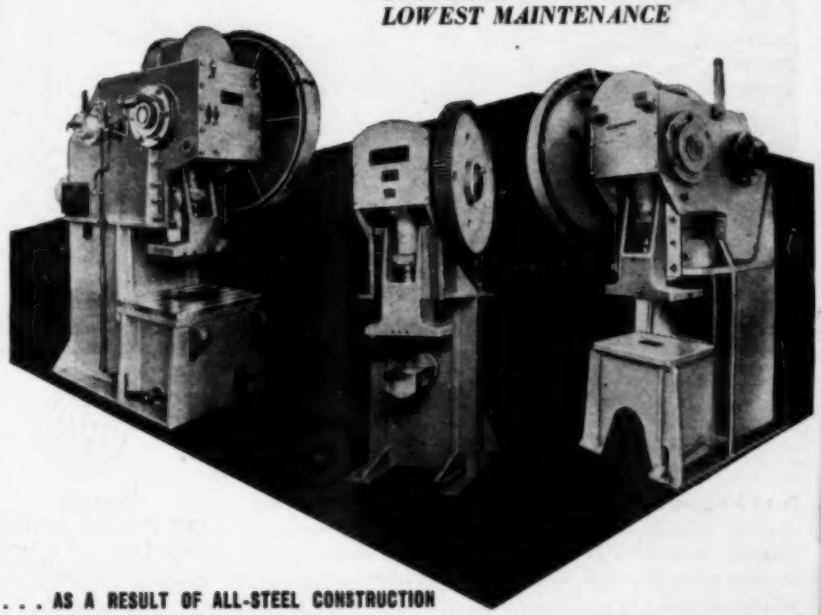

. . . AS A RESULT OF ALL-STEEL CONSTRUCTION

Size for size, all-steel fabricated presses are more rigid than conventional cast frame types—and rigidity in a press adds up to longer die life, more accurate output and sustained operating. If you are looking for ways to increase your earning power, start with your plant—a change over to all-steel presses will bring production economies plus lowered maintenance.

The facts are yours without obligation.

Left—120 ton all-steel Open-fronted Press.

Centre—75 ton Horn Press.

Right—75 ton Open-fronted Press.

Available as Horn and Swinging Table Presses. Good delivery subject to prior sale.

Welded Products Limited

94-96 O'RIORDAN STREET, ALEXANDRIA, N.S.W., AUSTRALIA
'Phone MU 2411 (3 lines). Telegrams and Cables: "Weldprod Sydney"

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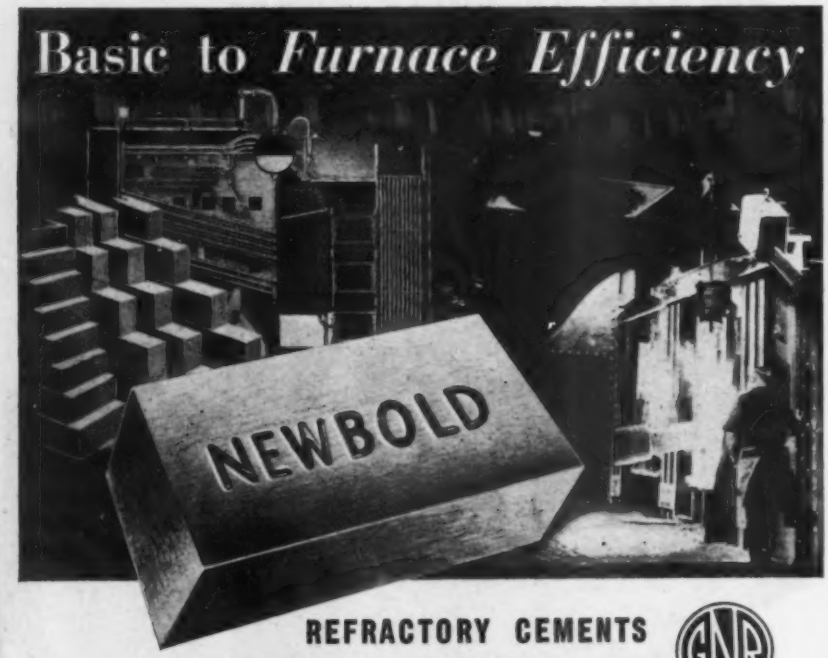

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Swedish engineers are giving the new doctor's calculations their unqualified approval. Most of the results have been obtained in connection with extensive telephone networks built by the Ericsson concern abroad, but tests have also been carried out in collaboration with the Swedish Telegraph Administration. In Sweden, alone, it is calculated, no less than Kr. 1,500,000,000 (£A.-129,375,000 — N.Z. 103,500,000) is invested in telephone equipment of which half is in networks.

WELDING CABLES.

The Standards' Association of Australia announces the issue for public critical review and comment of a draft Australian Standard Specification for Welding Cables (Document 161).

The Australian draft has been prepared largely on the basis of the section on cables in B.S. 638, Electric Arc Welding Plant and Equipment. The requirements for welding cables now in A.S. No. C.97, A.C. Arc Welding Plant and Equipment, will be deleted when this draft is published as a standard.

The specification provides for two types of welding cable, a "normal" type and a "heavy duty" type; the former has uniform thickness of insulation and sheathing, whilst the latter has standard insulation and heavier sheathing. Both types are provided with a dry separator between the conductor and insulation to afford greater flexibility.

Copies of the draft specification can be obtained from the Headquarters of the Standards' Association of Australia, Science House, 157 Gloucester Street, Sydney, and from branch offices in all capital cities of the Commonwealth, and in Newcastle, N.S.W., to which addresses, comments on the draft, should also be sent not later than 15th December, 1950.

DECENTRALISATION OF INDUSTRY.

"N.S.W. is now widely regarded as a land of great industrial opportunity. The Department of Secondary Industries in that State is dealing, almost every day, with a number of enquiries from overseas manufacturers whose wish it is to settle in this country," said the Minister of the Department, Mr. Dickson.

Mr. Dickson was speaking at a cocktail party given recently in his honour by the Country Manufacturers' Association.

"Great industrial expansion is taking place," he said. "In June, 1945, N.S.W. had 11,350 factories. In June, 1949, there were 16,087—an increase of more than 1,000 a year for the four-year period. The Department of Secondary Industries has been directly responsible for guiding more than 300 manufacturers to growing country towns.

"It has been my privilege to see for myself the beneficial results of this decentralisation policy. Young people are given remunerative employment in their own home towns. Career opportunities are opening up and the drift to the city is being steadily arrested.

"The decentralisation policy of the Government has an important defence aspect. Dispersal of population is essential. Wherever possible the Department of Secondary Industries will advise overseas manufacturers to set up their production units in country centres.

"N.S.W. is now absorbing about 80,000 new Australians a year. We must help them to settle down happily.

"Among these people are gifted artists, scientists and scholars, who bring with them the cultures of other lands.

"Others are skilled, creative artisans. More than 53 per cent. of the craftsmen arriving now are bricklayers, plasterers, carpenters and other workers who will contribute directly to the solution of our home-building shortage."

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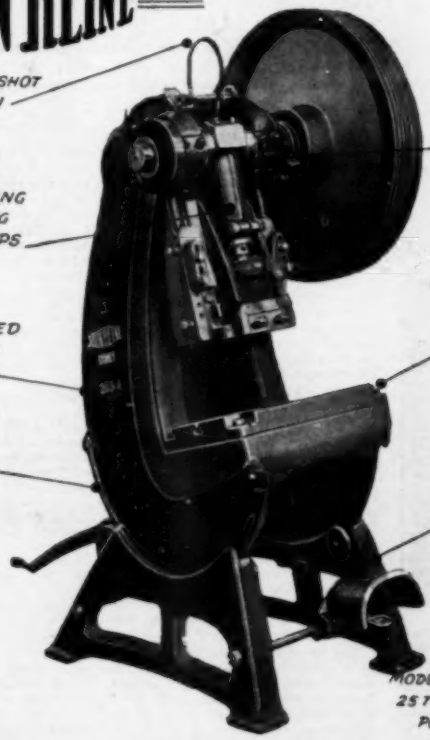
A new bending machine is intended for the bending of small tubes and sections. It is capable of bending tubes cold and unloaded, up to ¾ in. dia. and solid bars cold up to ½ in. dia. maximum. Angles, T-sections, channels and strips, either on edge or flat, can also be handled.

The base is a grey iron casting, drilled for bolting down to a bench, and provided with lugs for holding in a vice. The top-plate is 3½ in. dia. and screws up and down the 1 in. dia. centre mandrel to engage the work.

Bending arm is operated by a lever made of bright steel bar, and takes the form of a steel head which pivots on the centre mandrel and carries the adjustable bending spindle and roller. This roller is provided with a groove in the surface to bend bar and tube.

A suitable former is placed over the screwed centre mandrel. This former is a disc, slightly thinner than that of the work, with the rim shaped to conform with the shape of the work. Strip material on edge and ¾ in. dia. tubes can be bent to ¾ in. radius without using a former, as the lower portion of the centre mandrel is protected by a hardened steel ring. [2587].

JOHN HEINE
SYDNEY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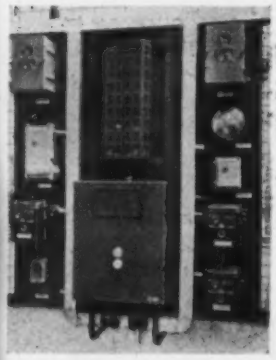
THE AUSTRALASIAN MANUFACTURER
[Page 48, December 9, 1950.]

Electrostatic Spraying and Detearing

Important Processes in Large-Scale Industrial Metal Finishing

The electrostatic process of spraying and detearing in metal finishing is now extensively used in the U.S.A., and has been successfully applied in British works during the past eighteen months. It is the object of this article to discuss the electrostatic spraying and detearing processes, their principles and functions and their particular application to large-scale industrial finishing.

THE theory of electrostatic spraying is based on that relating to electrostatic dust precipitation. It is interesting to note that this latter phenomenon, first observed by Rafinesque and Hohlfeld in the early nineteenth century, was referred to spasmodically in research during the ensuing seventy-five years; it was commercially applied when reliable high-voltage equipment was developed at the beginning of the twentieth century by Sir Oliver Lodge in England and by Dr. Cottrell and Dr. Moeller in the United States and Germany respectively. It was not until 1938 that this same principle was applied to paint by Mr. Harold Ransburg.



Control panel carries the electronic spark guard, interlock relays, warning bell, and so on. Some items are duplicated, as this panel controls two booths. Spark guard cuts the low-tension supply to the transformer if a workpiece comes within sparking distance of electrode.

In the electrostatic-spraying process, which is entirely automatic, the articles to be painted are carried on an earthed conveyor through a coating zone where a highly ionized electrostatic field is created between them and an adjacent electrode system which is charged to a negative static potential of 130,000 volts. Atomized coating material is sprayed at low velocity into this field between the electrode and the articles. At the high voltages used, an invisible corona discharge takes place from the fine wire of the electrode proper, i.e., the discharge electrode, resulting in the emission of electrons which, under the influence of the electric field, strive to reach the electrode of opposite polarity, viz., the workpiece, which is earthed through the conveyor.

The electrons on coming into collision with paint particles in the intervening air space, attach themselves, thus building up a negative charge in the paint particles and causing them to move to the earthed workpiece where they give up their charge and remain, owing to the adhesive nature of the paint itself.

In a Paper presented to the Sheet and Strip Metal Users' Technical Association at Birmingham, England, and later reproduced in "The Machinist", John Stribley points out that it will be noted that the electrostatic spraying process differs radically from hand spraying or mechanical automatic spraying in that the spray is not applied at right-angles to the surface being coated but roughly parallel to it and in line with the conveyor travel.

The spray-coating zone is housed in a booth through which an exhaust air flow of 100 ft. per minute is maintained, and this booth is of such dimensions that there is an insulating air space of 18 in. to 24 in. all around the electrode system; the articles being painted are suspended from the conveyor inside the electrode and at a distance of 12 in. from it. This ensures that the electrostatic field strength is concentrated between the electrode and the articles on the conveyor and not between the electrode and the spray booth or ground.

The spray guns are located at the open front of the spray booth and spray continuously into the coating zone through which the goods are travelling.

POWER SUPPLIES.

The high-voltage source is an oil-immersed transformer of the magnetic-leakage type with 230v., single-phase, 50 cycle input, together with a series of selenium metal rectifiers giving half-wave rectification and producing a pulsating unidirectional source at a potential of 130,000 v. and with a maximum current of 7.5 milliamps at the output terminal. The charge is carried by means of a tubular copper conductor supported on long insulators and through an insulating bushing in the booth wall to the electrode which consists of a light tubular or rod framework across which 29 g. wires are attached at 8 in. intervals. This electrode assembly has a cross-sectional area dependent on the size and shape of the article to be painted and has a depth of 4 ft.; the arrangement is shown above.

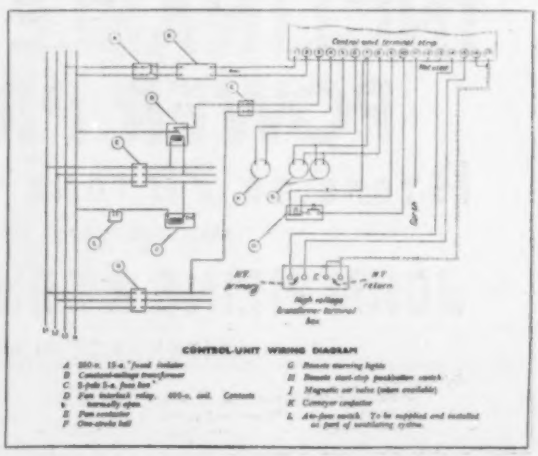
High-voltage control is by means of a pushbutton unit adjacent to where the operator stands, this being included in a system of electrical relays and interlocks which will be described subsequently, together with other safety precautions.

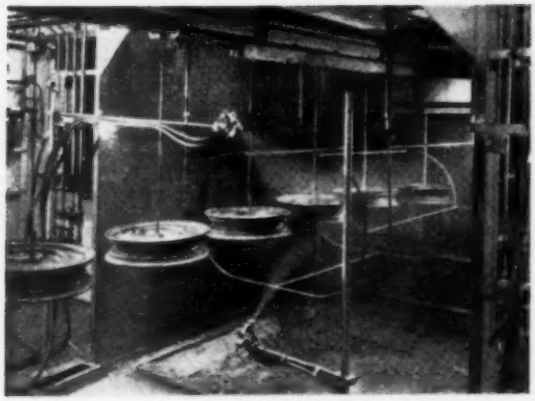
Electrostatic spraying of metal locker panels in an American plant. The unit shown is one of two, both prime and finish coats being applied in identical booths. Interior surfaces cannot normally be coated, as an electrostatic field will not exist on the inside of a hollow conductor.

The paint or other liquid coating material in use, is fed by means of an orthodox pressure feed or circulating system, with the addition of a metering device in the form of a specially designed liquid-pressure regulator, accurate to within ¼ lb. per sq. in. These regulators are located at the front of the spray booth and normally one is used with each gun to allow individual pressure adjustment. The spray guns themselves are of the fully automatic type controlled by a compressed-air lever valve conveniently placed for the operator and actuating the spraying mechanism by means of a pneumatic piston assembly.

SPRAY FORMATION.

The characteristics of the paint spray formation are much more critical than those associated with manually operated equipment and extensive research has been carried





Monorail installation for finish coating motor-car road wheels. Automatic gears are mounted above and below the work and spray directly into the formed electrode grid.

Typical spindle conveyor unit designed for producing a two-coat finish on disc-shaped articles. Paint and air controls for a range of four colours can be seen on the right.

out by the British manufacturers concerned before meeting these exacting requirements. A controllable spray width is necessary up to a maximum of 24 in. measured at a distance of 24 in. from the nozzle tip, together with even paint distribution throughout the spray pattern. Small and uniform particle size is required and a low forward velocity in the region of 400 ft. to 450 ft. per minute, again measured at 24 in. from the nozzle tip. A further condition is that the gun must function reliably in continuous operation and be free from excessive paint build-up on the aircap. By means, therefore, of the accurate paint- and spray-control arrangements and correct gun positioning, it is possible to produce paint films of even and controllable thickness continuously, with the virtual elimination of rejects.

PAINT FORMULATIONS.

The paint formulations themselves usually require no alteration whatever, or modification of a minor nature only, although the solvent balance of the thinner used may be slowed somewhat, in order to ensure that the paint particles are sufficiently wet at the remote end of the coating zone, 5 ft. from the gun, where deposition commences. The viscosities of finishing materials sprayed electrostatically are normally rather lower than those employed by other methods, being in the region of 15 seconds to 20 seconds, using the No. 4 Ford cup. This is necessitated by the requirement of low particle velocity through the coating zone, which limits the atomization pressures used to around 20 lb. per sq. in. while still maintaining a high standard of atomization.

Having dealt so far with the basic principle of the electrostatic spraying process and the equipment involved, the next consideration should be the functioning of the process in actual production. The type of conveyor employed will be determined by the characteristics of the goods being coated, i.e., articles suitable for vertical suspension either singly or in groups will be carried on a monorail; small parts requiring support from below are accommodated on a floor-mounted spindle conveyor, and flat panels to be coated on one side only are carried on a metallic belt or mattress conveyor.

In the case of medium-sized work of roughly circular shape, such as oil drums, a monorail is used with the parts spaced a few inches apart to avoid contact should slight swinging take place, and these are rotated through the coating zone in order to obtain optimum conditions for even paint distribution by bringing each portion of the surface in turn adjacent to the electrodes. A speed of rotation of two to three revolutions per forward foot of conveyor travel is usually employed.

WORK LOADING.

Work may be loaded immediately before entering into the electrostatic booth or at an earlier stage on the conveyor so that degreasing or other preliminary processes may be carried out automatically without intermediate off-loading and reloading. As the parts are carried into the painting zone they commence attracting the atomized paint and, during their progress through the 4 ft. length of the electrode, the complete film thickness is progressively built up so that they emerge with a full wet coat. The usual practice is to allow a flash-off period, dependent upon the characteristics of the paint used, before entry into the baking oven.

A typical monorail installation of this type is depicted above, left, where primed motor-car road wheels are shown being given their finish colour coats in the works of a well-known manufacturer. The wheels pass through the enveloping electrode where their upper and lower surfaces are coated by means of two automatic guns inclined rather more than usual towards the work, in view of the considerable concavity of the lower surface and the narrow groove on the upper surface where the centre is riveted into the rim. This illustration actually shows only half of the complete unit as a similar booth produces a second coat after a short flash-off period.

DUPLICATED EQUIPMENT.

A vertical spindle conveyor unit is shown above, where a workpiece of disc shape receives two coats of paint in the same booth by using two 90° conveyor bends and a short length of straight conveyor at the back of the booth. The duplicated electrode and spraying equipment thus produce the first coat as the articles enter the booth, and a second as they leave it. All controls and regulators are grouped and located on the panel on the right-hand side.

Small and dissimilar parts can be painted either singly or on multiple jigs carrying up to about 100 pieces and, in many instances where production comprises parts of comparatively large size together with large quantities of small fittings, the mounting of the small fittings on multiple hangers producing approximately the same general shape and surface area as that of the larger component, enables the entire output to be painted continuously and without batching.

OTHER MATERIALS SPRAYED

This process has so far been referred to in connection with paints generally and stoved finishes in particular. This is due to the very wide use of such materials in the mass-production finishes at present used. Other liquids of comparable viscosities can, however, be applied with equal efficiency, and cellulose materials, emulsions, oils, etc., have given entirely satisfactory results.

It has also been emphasized that a satisfactory earthing contact must be maintained between the goods being coated and the conveyor and, although the most general application has been to metal articles, the moisture content of timber has enabled several wooden articles to be successfully sprayed in this way, and plastics and other non-conductors may be treated, provided that they can be attached to a conducting backing or core.

Interior surfaces, however, cannot normally be coated electrostatically as no electrostatic field exists on the inside of a hollow conductor. Deep recesses also present similar difficulties because of the electrical shielding caused by surrounding conducting material. The presence of recesses does not, however, always eliminate the possibility of electrostatic coating as, in many cases, the goods can be so mounted and the spray guns so positioned that the sprayed material is driven mechanically into the recesses while the rebounding overspray is deposited electrostatically on the outer surfaces. This principle is employed to some extent, on the motor-car road wheels previously described.

It is on the basis of the economics of electrostatic spraying that the process has been so widely accepted in England and the U.S.

ECONOMICS OF PROCESS.

(1) When compared with hand or mechanical spraying it has been found that the very large reduction in overspray enables paint consumption to be reduced by about 50 per cent. This figure has been obtained from data contributed by some hundreds of American users and, whereas, in applications where hand spraying was not unduly wasteful, this figure may be reduced to 30 per cent., other instances have shown paint savings of 75 per cent. Some accurate figures are available on English installations and the painting of oil drums has shown a paint reduction of 30 per cent. to 35 per cent.; wooden tennis-racket frames have been coated at the rate of 330 frames per gallon against a figure of 140 obtainable by hand-spraying methods; and in the case of the motor car road wheels, the paint

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consumption has been reduced by 66⅔ per cent. compared with hand spraying methods and does, in fact, show a considerable economy even over dipping.

(2) One electrostatic plant can do the work of from four to twelve manual operators and requires only one machine minder.

(3) Superior finishes may be obtained owing to the accurate control possible and the uniformity of the electrostatic field. Rejects may thus be reduced almost to the point of elimination.

(4) Floor space may be saved as one automatic unit replaces a number of hand booths and, in the case of flow production, the finishing process can be incorporated in the production line.

(5) Reduction in maintenance costs may be effected owing to the reduced paint waste and the less frequent need for booth and exhaust-duct cleaning. This consideration brings with it a lessening in the fire hazard in so far as it might arise from deposits of dry paint residue.

(6) The replacement of a number of hand-spray booths by a single unit will also reduce the fume-exhaust requirements and consequently the winter heating load.

SAFETY PRECAUTIONS.

Certain safety precautions are necessary in order to permit use of the process in factories generally. The relevant hazards in this case are those of personnel and fire. The personnel hazard is due to the possibilities of electric shock, and the fire hazard to the possibility of spark ignition of any concentration of inflammable vapours. Here again American experience has proved of great value as a system of precautionary measures has been evolved to meet the requirements of the authorities there which proved to require comparatively small modification for use in this country.

In the first place, the output of the transformer cannot exceed 7½ milliamps at the output terminal, and the amperage available at the electrode is considerably less than this. The transformer, furthermore, is housed in an enclosure which is kept locked and provided with an interlock switch on the door so that the primary circuit is broken before access can be obtained; in addition contact cannot be restored by simply closing the door, but requires separate switching operated from outside.

All high-tension leads are kept inaccessible and guarded should they come within reach of personnel.

The charged electrode is 1 ft. back from the front of the booth and a guard rail 4 ft. high and 18 in. in front of the booth prevents inadvertent contact with the charged portion.

In addition to the interlock in the transformer-access door already referred to, the motors actuating the ventilating system and conveyor movement are electrically interconnected with the low-tension supply to the transformer so that the electrostatic field cannot be established until both ventilation and conveyor are in operation, and failure of either will cause the supply to the transformer to be cut off. This precaution effectively eliminates the possibility of the high-tension supply being accidentally left on after the plant is closed down.

When the electrode is energized, two large red signal lights are automatically switched on which serve as an adequate warning, and the fact that two are present eliminates the possibility of bulb failure rendering the device inoperative.

ELECTRONIC SPARK GUARD.

An electronic spark guard is incorporated in all installations of this type. This is designed to cut off the low-tension supply to the transformer in the event of a sparking condition approaching due to a badly hung or swinging

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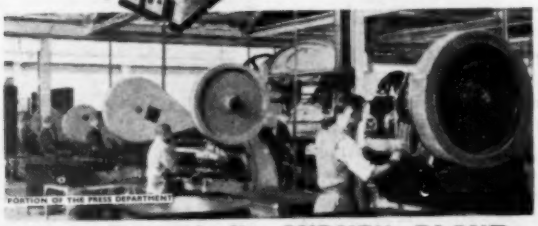

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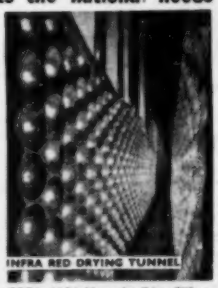

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workpiece coming within sparking distance of the electrode. In this instrument a potential proportional to the corona current under any particular condition is imposed on the grid of a gas-filled relay valve which is arranged to trip the low-tension supply in the event of an excessive discharge causing a sparking condition to become imminent. The corona current will be proportional to the size of the workpiece and the conveyor loading so that spark guard adjustment is provided to cover varying conditions.

When the spark guard operates, owing to the proximity of a sparking condition the red lights go out and a warning bell notifies the operator. The electrode cannot then be re-energized until the fault is corrected.

A ventilating condition where 10,000 to 12,000 cu. ft. of air are exhausted from a spraying chamber per gallon of solvent evaporated, is generally regarded as satisfactory. The exhaust standard specified in all installations is such that this figure is always exceeded, frequently by as much as twenty times, so that the possibility of a concentration of solvent fumes is entirely eliminated.

A further precaution is that it is not possible to operate the spray guns until the exhaust fans are functioning. This is accomplished by the inclusion, in the compressed-air line operating the guns, of a solenoid valve actuated by means of an air-flow switch in the exhaust system.

The form of fire extinguisher most generally used in electrostatic spraying installations is the carbon-dioxide-gas type. Automatic operation is frequently included and in this case the extraction fan is automatically switched off as the extinguisher equipment is actuated.

The electronic spark-guard switch, relays, etc., controlling the electrical functioning of the plant are shown on page 48, which actually duplicates certain units as this panel controls two adjacent electrostatic booths. It will be noticed that this arrangement is in no way cumbersome and does not detract from the efficiency and little from the simplicity of operating the spray process.

DETEARING PROCESS.

The electrostatic detearing process is closely allied to the spraying process already described, in

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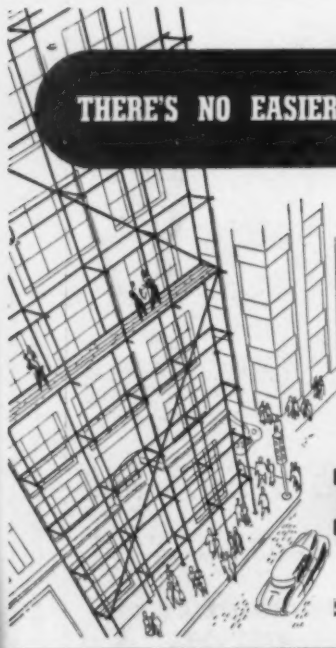

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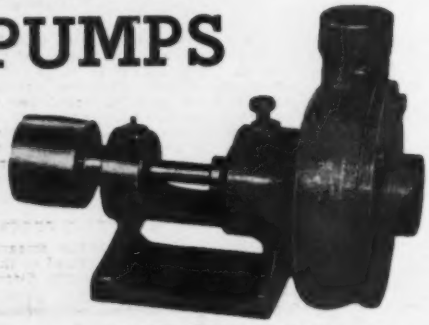

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that it is based on the establishment of an electrostatic field of high potential between the workpiece and a charged electrode. The method of applying finishing materials to manufactured articles by dipping and flow-coating is widely used and its features are generally known. Its most serious difficulty and limitation has hitherto been the inherent tendency to accumulations at drain-off points in the form of "fatty edges" and "tears". These defects are not only unsightly but, as the baking schedule must necessarily be based on the normal coating, any heavy accumulation will remain soft in the case of the oleo-resinous type of material and may produce localized brittle and chipping conditions where polymerizing materials are used. The need is thus apparent for a means of eliminating these accumulations, and this is provided by electrostatic detearing.

SEQUENCE OF OPERATIONS.

In this process the goods are suspended from an earthed monorail or flight bar conveyor and are either manually or automatically dipped in the normal way. A drain-off period then follows during which excess coating material leaves the surface. This continues until the last droplets are formed which are on the point of setting and which would not fall without assistance. At this point the workpieces are carried over a comparatively massive electrode to which an electrostatic charge of high negative potential is applied. A strongly attractive electrostatic field is thus established between the drain-off points of the work and the electrode proper, in which case the drain-off points become a discharge electrode and the charged grid the collecting electrode. Coating material from the drain-off points is thus drawn off in the form of a fine spray or threads until the normal film thickness is obtained, the time taken ranging from about ½ to 2 minutes. The articles are then carried through the oven when baking takes place.

CONTROLLING FACTORS.

There are a number of controlling factors which must be observed for optimum results from electrostatic detearing, these being as follows:

The drain points of the articles being deteared must be carried over the charged grid at a fairly constant distance from it, usually 8 in. to 10 in. Furthermore, these points should be of small radius, preferably under ¼ in., and should not be shielded from the influence of the electrostatic field.

The electrostatic grid may be formed of a tubular metal frame covered with wire mesh, expanded metal or similar material. Its length will be determined by the speed of the conveyor and the detearing time required, this time having been previously obtained by test.

The timing of detearing on the conveyor is important for if this is carried out before draining is complete and flow has practically ceased, secondary tears may be formed. Conversely, if detearing is too late, excessive hardening of the accumulations may have occurred and their removal may not be complete. It should be noted that detearing takes place only when paint accumulations are present at drain-off points, and it has no influence in accelerating normal draining.

Normal dipping materials usually respond well to detearing, although in the case of those of a thermo plastic nature, some modification may be necessary in order to obviate any tendency to the formation of tears during secondary flow within the stove itself. Otherwise, most synthetic materials formulated for dipping are suitable usually without alteration, although in some cases a slightly altered solvent balance aids the production of optimum conditions.

(Turn to page 66.)

Automotive Parts Manufacturers Hold Convention

THE members of the Automotive Products Manufacturers' Association of Australia recently held their Annual Convention at Albury, in N.S.W. when questions of vital importance to the motor industry and to users of motor vehicles were discussed. Members from Victoria, New South Wales, South Australia, Queensland and Tasmania attended.

One disturbing problem facing the manufacturers was the fact that statistics prove that at June, 1948, in Victoria, New South Wales and Tasmania, there are 166,393 motor vehicles in operation which have had twenty and more years of service, and 380,705 vehicles of ten years and over. Overseas the useful life of a motor vehicle pre-war was 6½ years.

Unless manufacturers maintain production of parts for these early model vehicles they will assuredly go off the roads, thus creating an even greater shortage of essential transport vehicles. Few people, and not many traders realise the colossal task facing the manufacturer of parts in supplying the multiplicity of parts for the very many makes and models of vehicles operating on the Australian roads and the difficult job in estimating the quantities of such parts for replacement requirements.

No other country in the world is even attempting to manufacture the range made by the parts manufacturers in Australia—but accepting the obligation to do so, as a national service to maintain the irreplaceable vehicles in operation, members of Automotive Products Manufacturers' Association of Australia (A.P.M.A.) at their Albury conference agreed to continue production even in face of the high production costs involved, and the motor industry and the motor vehicle user must be grateful for this decision.

Another very important matter discussed was the question of orderly marketing to ensure that Australian-made parts and accessories would be available to the user at the best possible prices consistent with protection of the resellers' profit margins. It was considered essential that the interests of the reseller be protected, as his economic prosperity would ensure efficient service to the motor vehicle user.

Federal Executive of the Automotive Products Manufacturers' Association.

It was recommended at the Convention that list prices of all parts and accessories be available in order that the reseller would adopt uniform selling prices with resultant protection of their rightful profits, consistent with reasonable prices to the consumer.

The Automotive Products Manufacturers' Association of Australia members also announced that they had established uniform prices in all capital cities of the Commonwealth, thus ensuring that the consumer in the far distant States would enjoy prices similar to those operating in the home States of the manufacturers.

The industry also confirmed its undertaking to the Government to make available its manufacturing resources for the production of machine tools, equipment parts and components for weapons of war when called upon in any emergency. It is notable to record

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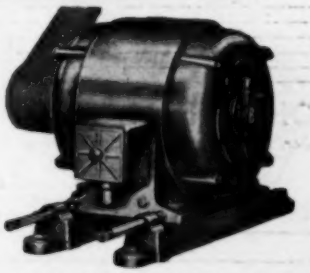

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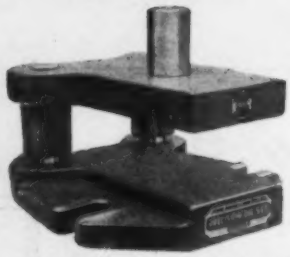

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that during the last war, the parts industry in Australia was practically depended upon for supplies of parts for the manufacture and maintenance of Australia's vast fleet of motor vehicles, including those of our American allies.

Plans were also advanced for the production of parts for original equipment on the new cars, trucks and tractors to assist in the expanding development of the many new manufacturing projects now in operation or planned for.

It is recorded with pride that the high quality of the products of the parts industry is largely responsible for the excellent performance of motor vehicles assembled and manufactured in Australia—notably the "Holden".

The officers elected at the Convention of the Automotive Products Manufacturers' Association of Australia were as follows:—President, Mr. A. Duly, N.S.W.; Vice-President, Mr. R. V. Butler, Vic.; Treasurer, Mr. W. E. Llewellyn, Vic.; and Assistant Treasurer, Mr. D. W. Deane, N.S.W.

Councillors:—Victoria, Mr. F. G. T. McKenzie and Mr. D. E. Callinan; New South Wales, Mr. G. W. Sample and Mr. A. A. Stevens; Queensland, Mr. C. B. Byrne; Executive Director, Stan H. Earle, and N.S.W. Group Secretary, Mr. Alan A. Geeves.

Tyre and Rim Association Formed

ONE of the most important announcements for many years in the automotive industry and probably the most welcome to the trade, was the recent formal announcement of the incorporation of The Tyre and Rim Association of Australia in the State of Victoria, under the Companies Act, 1938, by Mr. D. C. French, Chairman of the Board of Directors of the Association. Another milestone in the history of the automotive and tractor industry in Australia has thus been passed.

The need for an organisation to correlate technical knowledge pertaining to tyres, rims and wheels and to establish, within the industry satisfactory engineering standards for application and enforcement, has been apparent for many years.

As early as 1940, steps had been taken to form such an Association under the guidance of Major C. Harle. Every assistance was given by the major rubber companies, as well as wheel and rim manufacturers, but, due to an increase in problems associated with production of military products, the plans for this association were temporarily placed aside.

The introduction of additional or new tyre sizes and types, as well as new developments in rims and wheels during and since World War II, gave added impetus to the demand and need for an organisation to establish and maintain standards for the industry. After a number of exploratory meetings, the first general meeting of all interested parties was held in Melbourne on 26th June, 1950, at which time proposed directors were nominated and various committees organised.

In order to further the objects and interests of the Association and its membership, comprising

(Turn to page 56.)

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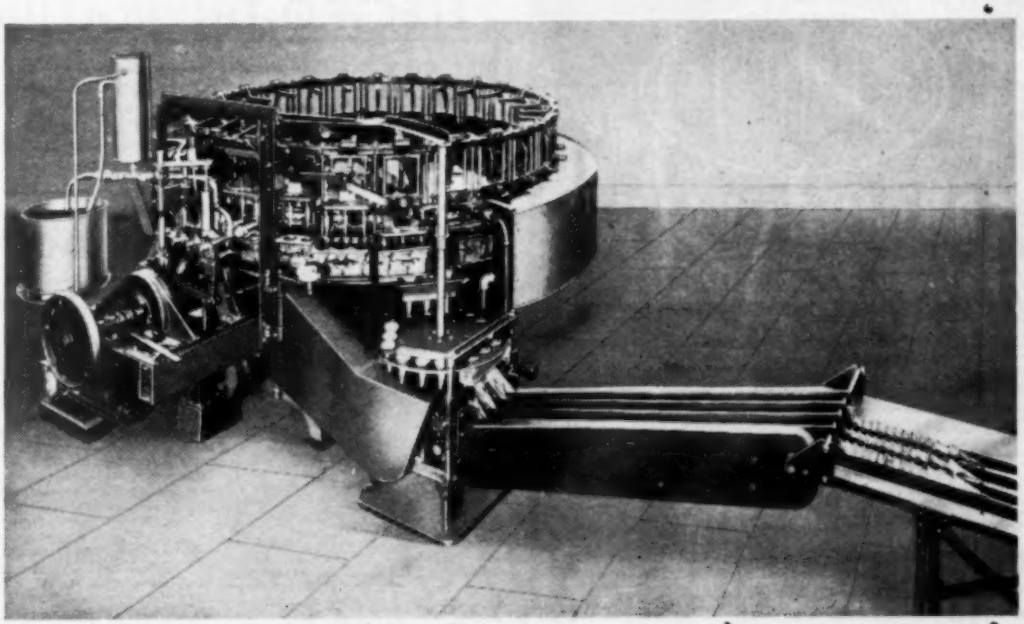

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(Continued from page 54)

firms or corporations engaged in the manufacture of tyres, rims and wheels, close co-operation and affiliation is being sought with The Tyre and Rim Association Incorporated of the United States and the Society of Motor Manufacturers and Traders of Great Britain.

Several meetings of Directors and the Standards' Committees of the new Association have been held, and the general policy for the immediate future has been outlined. The most important decision is the basic policy relating to standards for tyres, wheels and rims. This is as follows:—

"(1) Where sizes are included in the Standards' Year Books of the Tyre and Rim Association of U.S.A., those standards will apply in Australia. (2) Where sizes not covered by the T.R.A. (U.S.A.) Year Books are included in the Standards' Year Books of the Society of Motor Manufacturers and Traders of Great Britain, the S.M.M.T. standards will apply in Australia. (3) Where sizes are manufactured in Australia and not covered by either of the above Year Books, the Association will lay down its own standards."

In the interim period to cover any practical difficulties which may arise until present methods can be brought into line with the above requirements, certain modifications will be condoned as permissible practice, but it is hoped to reduce the "change over period" to the barest minimum compatible with reasonable recognition of the difficulties of the manufacturers.

It is hoped that manufacturers and consumers alike will take advantage and make use of the know-how and data made available by this Association. The correct application of tyres, tubes, flaps, rims and wheels will go a long way towards increased service and consumer satisfaction.

An indication of the interest and support is evidenced by the following list of Directors of the Association: The Goodyear Tyre & Rubber Co. (Australia) Limited, Dunlop Rubber (Aust.) Ltd., Olympic Tyre and Rubber Co. Ltd., Australian Steel Split Pulleys Ltd., and Malcolm Moore Pty. Ltd. Membership includes all manufacturers of tyres and tubes, as well as the manufacturers of wheels, rims and accessories.

Correspondence should be addressed to the secretary-treasurer, Mr. W. A. Coghlan, F.C.A. (Aust.) of F. A. & W. A. Coghlan, Chartered Accountants (Aust.) at the registered office of The Tyre and Rim Association of Australia, 409-415 Collins Street, Melbourne, C.1.

Electrostatic Spraying

(Continued from page 52.)

In the case of detearing, the spectacular economies effected by the electrostatic spray process are absent, but the standard of finish produced is vastly improved and frequently permits the substitution of a better and sometimes quicker stoving paint when the need for minimum flow is eliminated. Furthermore, it may be found that the high-quality finish thus produced makes it possible to dip goods which hitherto required hand spraying on account of inspection requirements.

The detearing process has been applied in Great Britain to electrical equipment and toys with conspicuous success regarding economy and finish and, in the case of a recent installation, accumulations of a suspension in a volatile medium have been removed after presenting an insoluble problem when other methods were tried.

The electrical equipment used in conjunction with electrostatic detearing may be of the same type as that employed for spraying, although on account of the rather lower electrical requirements, a direct-current generator has proved very satisfactory. Whichever type of plant is recommended, safeguards are provided on the same lines as those indicated for use with spraying installations.

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Twenty-one Ways to Lower Production Arc Welding Costs

(From W. J. Austen, Commonwealth Manager, The Lincoln Electric Co. (Aust.) Pty. Ltd.)

All manufacturing costs are created by the consumption of time and material. Welding costs are a combination of the amount of metal needed to make a welded joint and the amount of time required to use that metal. Material is both electrode and base metal, while labour is both direct labour and indirect labour, in such elements as supervision and power.

ANY discussion of how to reduce welding costs must be an investigation of ways and means of using less time and material to do the same or equal job of joining metals. Such an investigation must start with the beginning of the product or its design, and carry through production methods to the welding procedures used. Each step of the investigation must be initiated with the question, "Is this step being done in the cheapest way possible consistent with the requirements of the product to be made?" The following suggestions will indicate guides, without detailed elaboration, to fields where further investigation will yield many production savings

DESIGN.

Cost is as much an element of machine design as any function for which a designer must plan. It is rapidly becoming one of the most important design elements. Designers must work, therefore, with a conscious effort to contribute everything possible to low cost manufacture. Design and production must compliment each other in trying to reach the desired goal of making better products for less cost.

There are many ways by which the designer can contribute to lower welding costs.

ANALYSIS.

1. **Material Analysis:** Material for a design should be selected as far as possible within a range of analysis which will normally not require special welding procedures. Nearly all metals are weldable, but certain of them require special procedures for successful results.

As electrode development produces new and better electrodes, fewer metals, however, fall into this class of requiring special procedure. An example of a recent development is the low-hydrogen, lime-ferritic electrode which readily deposits dense, strong, ductile welds in high carbon and high sulphur steel normally considered to require special procedures.

2. **Material Size and Shape:** In planning an assembly, the size of plate used not only affects the amount of material directly but also heavier plate will probably require more weld metal. Frequently designs can be changed to reduce plate size yet maintain strength requirements.

Some steel mills, particularly in the U.S.A., are now supplying a variety of rolled shapes which lend themselves to simplified welded design. Beams, channels, T sections and other shapes are rolled with rounded corners.

In both structural and machine design, it is fairly common to modify standard sections, by cutting and welding them to fit the design.

3. **Joint Design:** It is not difficult for a designer to determine the required strength at a given joint. Once this is determined, however, it becomes a matter of importance to fabricating costs what type of welded joint the designer specifies to achieve the desired strength. There is considerable choice as to joint type and the designer must select this with one question in mind.

What is the cheapest joint that will meet strength and appearance requirements of the job?

Welded joints are made in two ways: Either by making a joint which consists largely of fused base metal or by making a joint consisting largely of deposited filler metal. The most economical weld will be that which requires the least edge preparation, the minimum amount of deposited weld metal and which can be made at maximum deposition rates.

Designers should be familiar with types of joints and their load characteristics so that selection can be made depending on load conditions. Depending upon load conditions, the designer can select the joint that will result in minimum deposited weld metal and minimum edge preparation.

For example, if a butt weld with 100 per cent. penetration is desired, several possibilities are available. The square butt joint involves no edge preparation, but it may have to be welded from both sides. This joint requires the least amount of deposited metal.

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The single vee joint requires more preparation and more electrode than the square butt joint. With the double vee joint cost of machining is higher than the single vee. However, it requires only half the amount of electrode for the same plate thickness.

In selecting the cheapest joint, therefore, both the cost of welding and the cost of machining in a given plant must be determined and the selection made for various types of joints and for various thicknesses of plate according to these basic cost figures.

Important also in specifying the cheapest joint is the location of the joint. Designers must avoid calling for welds in inaccessible locations. Familiarity with the welding process to the joint of actually doing some welding will help the designer avoid putting welds in spots which cannot be reached with an electrpte.

4. **Overwelding:** Any amount of weld metal in addition to that needed for the specified strength is useless and costly. A slight amount of build-up cannot be avoided in some cases, such as a square edge butt joint. Where it cannot be avoided, build-up should be kept at a minimum.

5. **Intermittent Welds:** Frequently, design conditions permit the use of short intermittent welds. A series of short welds will be cheaper to make than one long continuous weld.

6. **Continuous Small Welds:** Sometimes overlooked by designers is the fact that a small continuous weld can produce strength equal to that of large intermittent welds. A six inch ¼ in. fillet weld is equivalent in strength to a three inch ½ in. fillet weld. The ¼ in. weld will require only half as much deposited weld metal as the ½ in. weld and can be made at twice the speed.

7. **Grinding and Finishing:** Grinding is frequently an expensive operation and designers should attempt to avoid it as much as possible. Welds can sometimes be placed on the inside of structures where they do not show, thus eliminating grinding. Grinding is also minimized by avoiding over welding while welds deposited with the "Lincolnweld" and other "hidden arc" processes are frequently smooth enough as deposited.

Weldments should also be designed so that parts requiring sand blasting and painting are accessible.

8. **Minimize Welding:** It is cheaper to form than it is to weld, and wherever possible, corners should be formed rather than welded. Various combinations of parts are possible and the availability of cutting and forming equipment and the cost of its operation will influence the choice of the most economical design.

Steel castings and forgings can also be used toward making costs savings in the design of a weldment. Factors such as the number of weldments to be made, limitations on fillet welds, inaccessibility and change in section will influence the decision on the use of castings or forgings. Bearing housings present an example where

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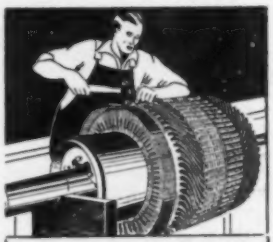

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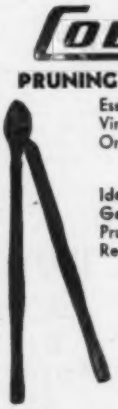

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sometimes forgings can be used to advantage.

9. **Distortion:** The control of distortion in weldments produces many manufacturing economies, such as savings in machining through procision welding and elimination of straightening operations. Much of this control can be achieved through correct design. The subject of control, however, is a broad one and has many possibilities. Only a few can be considered here.

The first consideration is to design so as to reduce the effective shrinkage forces created by the welding. This means using smaller welds and avoiding overwelding. Intermittent welds and minimum weld metal should be used. Welds should also be placed near the neutral axis of any structure so that the leverage of the shrinkage force is reduced.

Another design consideration to control distortion is that of balancing one shrinkage force against another. This may be done by placing welds on the structure so that as one section of weld metal shrinks it will counteract the shrinkage force of previously made welds. Placing welds intermittently on opposite sides of the neutral axis of a butt weld is example of this technique. Fillet welds can be made by staggering intermittent welds.

Welding is basically a process for low cost manufacturing. The advantages of the process, however, can be largely nullified by the failure of designers to approach their problems with the primary consideration of taking advantage of the low cost possibilities. Designing to save material, making a machine lighter yet stronger must be the fundamental design approach. Imitation of previous methods will not produce the desired results.

PRODUCTION.

Design and production must work closely together so that a design is created which can economically be manufactured with equipment available in a given plant. Designers may find existing production methods restricting, but acceptance of the restrictions usually results in the most economical design.

Co-operation between engineering and production should be organized so that no design is considered final until the welding engineer and production men have gone over it to assure that its manufacture is practical.

After the product is designed, however, it is the welding engineer's job to put the product into production in the best possible way. His decisions on methods are as important as those of designer on design in their effect on ultimate cost.

1. **Choice of Process:** There are other methods of welding than arc welding, and it is possible that some other method of welding may be the most economical. Within the arc welding process, however, there is a wide selection of methods possible. The selection, of course, may be limited by already existing facilities. On the other hand,

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economies available with some other method may warrant the purchase of new equipment.

Both AC and DC welding current have their own particular advantages. Only careful study will determine which type of current is best suited to the job.

Where the quantity of production and the uniformity of the shape of weldments permits, automatic hidden arc welding will usually produce savings of a nature that warrant an outlay for equipment and fixtures. Table I shows the comparative speeds for hand welding and automatic welding. In some cases, automatic welding speeds are up to six times as fast as hand welding. In addition, these are further savings as a result of the automatic nature of the operation. The net result of the high current densities employed in the process is deeper penetration, less joint preparation and in consequence less weld metal needed, with far higher deposition rates. Less distortion is encountered. There is little or no cleaning, and finishing operations are easier.

TABLE I.
Comparison of Hand Welding Speeds to Automatic Speeds.

Hand Welding.

Material.	Weld.	Passes.	Amp.	Speed, Ft./Hr.
10. Ga.	butt	1	180	120
¼ in. Ga.	butt	3	350	19
½ in. Ga.	butt	8	350	6
10. Ga.	edge	1	160	200
10. Ga.	lap	1	200	90
¼ in. Ga.	lap	1	375	50

Automatic Welding.

Material.	Weld.	Passes.	Amp.	Speed, Ft./Hr.
10. Ga.	butt	1	650	500
¼ in. Ga.	butt	2	800	68
½ in. Ga.	butt	2	1,000	22
10. Ga.	edge	1	600	500
10. Ga.	lap	1	750	400
¼ in. Ga.	lap	1	625	180

TABLE II.
Relative Cost of Depositing One Pound of Electrode with Different Size Electrodes.

Size — inches.	1/4	5/32	3/16	1/4	5/16	Hidden Arc Welding.
Amperes.	110	130	160	230	350	800
Cost/lb. — Deposited metal.	d200	157	133	78	62	49

Calculations on the basis of 25% loss through spatter, stub end and coating loss; 100% overhead; 1d. KWH power; 48d. per hour labour; 30% operating factor.

2. **Edge Preparation:** Several choices are open in deciding upon how to prepare material for welding. Here, as with joint selection, the method used must be a balance between the basic costs of preparing and welding. Shearing and blanking are the most economical where they can be used. Flame cutting can be done to close tolerances with equipment. Machining is necessary for precision work.

3. **Fit-up:** The type of edge preparation used must be selected with the importance of good fit-up in mind. Many of the economies of automatic welding are made possible because it is necessary to have a precise fit-up for automatic operation. The machine makes no allowance for variance in fit-up as does the hand operator.

If the same care is used in fitting for hand welding as is used in fitting for automatic welding, astonishing cost reductions can be made.

The importance of fit-up cannot be over-emphasized, as the person making the fit-up is just as responsible for low cost production as is the welder. Fit-up not only affects the cost of welding but also influences the performance of the product. It increases the amount of metal required and increases the amount of time through decreased welding speeds. A square edge butt weld on ¼ in. plate when welded with a 1/16 in. gap can be made more than twice as fast as the same weld with a 1/8 in. gap.

4. **Sub-assemblies:** In planning the flow of production, time will be saved, generally, by using sub-assemblies wherever possible. This will permit easier access to many joints that have to be welded. It will facilitate inspection and, in some cases, painting and stress relieving where this is necessary.

Sub-assemblies will also increase operating factor by allowing greater use of helpers to set up jobs for welders. A helper to set up a job in a jig, while the welder is weld-

(Turn to page 62.)

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(Continued from page 60.)

ing in another, can double the output of the welder. One-half of the welder's output is secured at the cost of one jig and one helper.

5. **Positioning:** The position of the joint to be welded has considerable effect on the speed and ease of welding. With the exception of sheet metal welding, welds should be made in the downhand position with the joint level wherever practicable. The change from vertical to downhand can increase the speed by as much as 400 per cent. It also simplifies welding since the electrode coating can be dragged along the base metal.

The use of jigs and fixtures will accomplish much in positioning work for the fastest welding.

6. **Inspection:** Inspection can be a valuable aid in reducing costs. To get the best results, a weld should be inspected while it is being made. An inspector by checking on the type and size of electrode being used and the current used can insure that welds of specified quality are being made at minimum cost.

A check during or before a weld is made will tell an inspector more about the strength of a weld than will measuring the weld with a gauge. The inspector can be assured that strength requirements will be met if correct procedure specifications are followed as to:

(a) Plate preparation.
(b) Electrode size and type.
(c) Current.
(d) Surface appearance.

The foregoing suggestions listed under **production** are directed largely toward maintaining maximum operating factor to reduce time consumed. There are many variables, however, that affect the operating factor. The control of variables will depend largely on the nature of each plant's operations. There are factors, such as working conditions, which may increase or decrease operator fatigue. Method studies on welding with the purpose of establishing operating conditions of maximum efficiency will uncover some unsuspected savings.

Cleaning of work to be welded to eliminate foreign matter and cleaning of finished welds are other important variables which must be controlled.

Clean joints, especially for automatic welding, will avoid holes in welds. A little edge preparation removing grease, rust and scale may mean the saving of spending a lot of time to make repairs to rejected welds.

Supply of electrodes, electrode changing, flow of material are other problems of production which offer the opportunity to reduce time.

PROCEDURE.

The **design** considerations which so far have been discussed have largely been concerned with saving material, while the **production** considerations have been concerned with saving time. **Procedure** is the concern of both the designer and the welding engineer, and involves saving both time and material.

(Turn to page 80.)

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PATENT SPECIFICATIONS ACCEPTED

BONDED MICA PRODUCTS.

138,182.—W. A. Boughton, C. L. Dawes, W. R. Mansfield, F. C. Hughes and D. M. Hill.

Claim 1. A method of producing high-heat composite inorganic-bonded mica plates including the steps of: moving successive individual plates in spaced relation through a heating chamber until the binder is raised to a state of flux, removing the thus heated individual plates in succession and subjecting them to compression while the binder is still in a state of flux, thereby to thoroughly bond mica films into a unitary plate.

Claim 2. An apparatus for producing high-heat composite inorganic bonded mica plate according to the method of the preceding claims, comprising in combination a heating chamber, means for moving individual mica plates successively through the heating chamber to bring the inorganic binder into a state of flux, a power press disposed immediately adjacent the discharge end of the heating chamber and arranged to receive successive heated plates directly from the chamber, and means for operating said press to effect compression of successive plates while the binder is still in a state of flux.

AMPLIFIED INTERCOMMUNICATION TELEPHONE SYSTEM.

138,179.—F. H. M. Everett.

Claim 1. Improvements in or relating to amplified intercommunication telephone systems, consisting of a remote instrument or unit and a main instrument or unit connected by two conductors and each containing a loud speaker which is also used as a microphone, either unit containing a source of electric direct current, a condenser, a relay and an amplifier all in circuit with the loud speakers and a switch to short circuit the condenser when the switch is closed, whereby both units are always ready for use and the amplifier assumes activity by closing of the relay when the remote unit is operated, and whereby a direct current is allowed to pass through the voice coils of one loud speaker and the relay coil by short-circuiting the blocking condenser in the remote unit, and the voice frequency alternating current is superimposed over the direct current when the apparatus is functioning.

ELECTRICAL HEATING DEVICE.

138,342.—G. H. Morey.

Claim 1. A heating device adapted to be detachably fitted to

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an article for heating the same comprising a plurality of layers of flexible, woven, fireproof fabric formed into a pliable resilient structure conforming substantially to the surface of an article to be heated, and an electrical heating element attached to one of said layers of fireproof fabric in spaced and non-shorting relationship, said heating element being covered by flexible, fireproof, non-conducting material.

Claim 12. The method of manufacturing a heater which comprises fitting a woven flexible fireproof fabric liner to the exterior surface of an article to be heated, attaching a resistance heating element to said liner, in spaced and non-shorting relationship so that direct contact of said element with said article cannot occur, attaching an outer layer of resilient insulating material between the two layers.

MULTIPLYING MACHINE.
138,354.—Powers Accounting Machines Limited.

Claim 1. A multiplying machine including in combination mechanism for setting up the logarithms of the individual digits of a multiplicand, mechanism for setting up successively in consecutive multiplying cycles, the logarithms of the individual digits of a multiplier, means operative under the joint control of both said set-up mechanisms, in each multiplying cycle, to add the logarithms of the contemporaneous multiplier digit to the logarithms of the individual multiplicand digits, whereby the logarithms of a series of partial products are obtained, means for converting said logarithmic partial products into their arithmetical values, and means for accumulating the arithmetical partial products.

RADIO RECEIVER CABINETS.
138,355.—Standard Telephones and Cables Pty. Ltd.

Claim 1. A radio receiver comprising in combination a self-contained chassis portion carrying the components of the receiver including a loud speaker and tuning controls and connections, two identically shaped cabinet portions adapted to enclose said chassis portion, each of said cabinet portions comprising sound louvres or apertures for the loud speaker, an aperture or apertures for giving access to the tuning controls and connections, and projections on the chassis portion for engagement between the meeting edges of the cabinet portions.

Claim 2. A cabinet for radio receivers formed of two identically shaped hollow moulded or pressed half-cabinets fitting together.

ELECTRIC CABLE TERMINALS.
138,550.—Standard Telephones and Cables Pty. Ltd.

Claim 1. A terminating and connecting device for one or more multi-conductor lead sheathed cables, comprising a block of thermo plastic material moulded under pressure in such manner that the block envelops a portion of the end of the lead sheath of the, or of each cable, the bared ends of the cable conductors being attached to metal terminals which are so held during the moulding operation that they project through the outer surface of the completed block, the block being so shaped that the insulated conductors and the points where the bared ends of the conductors are attached to the terminals are completely embedded in the moulded block, and in which the thermo plastic material is caused to penetrate into the end or ends of the lead sheathed cable or cables during the moulding operation through any interstices in the cable insulating material.

HAND GRUBBING TOOL.
137,814.—C. C. Croft, N.Z.

For clearing and cultivating, a hand tool having a blade of flat cross section projecting at right angles from a socket at one end and extending across the line of the socket has a front edge slightly concave from end to end and continuing to the socket and a back edge curving rearwardly from a hook like point and inwardly to the socket end in a line approximately parallel with the front edge.

COMBINATION WOODWORKING MACHINE.
138,298.—A. Nixon.

Claim 1. A portable combination woodworking machine, comprising a table top mounted upon a framework, a beam mounted on rollers resting upon a runner carried on transverse members affixed between the legs of said framework, said beam being beneath and having free passage beyond the front of said table top, a handle at the forward end of said beam and a stop piece adjacent the handle for limiting the rearward travel of said beam, a transverse shaft mounted in bearings on said beam near its centre, a circular saw upon the inner end of said shaft, the periphery of said saw extending through a longitudinal slot in said table top, a motor mounted on a spring loaded platform rigidly suspended from said beam at the rear of said saw shaft, a vee belt drive over pulleys respectively on said shaft and the motor shaft, and a stop piece on said beam in front of said saw and behind the forward end of said framework for limiting the travel of said beam in a forward direction.

Claim 3. A portable combination woodworking machine as claimed in Claim 1 wherein a small platform is supported from the lower bracing of the framework at the rear thereof and carries an eccentric shaft in bearings and wherein a vee belt pulley on an eccentric on said shaft is connected by the pulley on the motor shaft and wherein an eccentric on said shaft is connected by a rod to the lower end of a jig saw blade, the lower end of said blade running in a guide on the underside of said table top, the upper end of said blade being connected to a spring loaded rod which runs in a vertical guide at the upper end of a detachable overhung arm.

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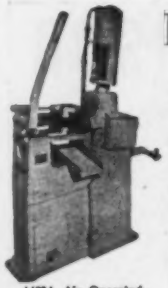

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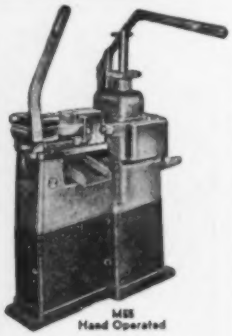

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REVERSIBLE PROPELLER.

138,297.—R. E. Bell.

Claim 1. A reversible propeller comprising a hub adapted for attachment to a rotatable shaft, a cup shaped hub shell having a concentric recess, said hub shell being slidably mounted to partially enclose said hub, said shell being adapted for attachment to a rotatable sleeve concentric with the shaft, said hub having radial pivot pins, a propeller blade rockingly mounted upon each pivot pin, each of said blades having a planetary inner face lying in a plane normal to the axis of its pivot pin, said shell having a wing pivotally connected to each of said blades, each of said wings being disposed parallel to the inner face of its blade.

STATOR FOR AXIAL FLOW COMPRESSOR.

138,300.—Rolls-Royce Ltd.

Claim 1. A stator for a multi-stage axial compressor comprising a tubular casing and a stator-blade assembly which includes a set of circumferentially-disposed blades for each of a plurality of stages of the compressor and a spacer ring between adjacent sets of blades to retain them radially and axially, there being means to locate the stator-blade assembly coaxially within the casing.

FORMATION OF RADIATION FINS.

138,301.—J. P. Williamson.

Claim 1. A method of forming the radiation fins or plates of pipes, tubing, conduit, ductwork and the like, consisting in forming such fins, plates or the like in several parts, with recesses, or edge slottings therein to fit over the pipes or the like and overlap a sufficient distance to allow the adjacent edge of each fin part to be engaged together through the agency of shaped formations on such edges, and the engaged formations squeezed together to draw the said fin parts inwardly on to the pipes or the like and securing said parts thereto.

Claim 2. Radiation fins, plates or the like formed in a series of parts, having slottings in one edge to take about a pipe or pipes from one side thereof; a stepped flange extending along the edge of such slotted side, and a hook-like edge shaping provided on such flange; the arrangement being such that on squeezing the engaged pair of hook-like shapings together, and back upon their flanges, the fin parts are drawn on to the pipes or the like and secured thereto.

INSULATED POWER CABLE.

138,295.—Standard Telephones and Cables Pty. Ltd.

Claim 1. Electric power cable or the like in which insulating wrappings are applied longitudinally in strips of such width that there is a gap between the edges of each strip, successive strips being applied in such manner that the gaps do not coincide.

Claim 6. Electric power cable comprising a central conductor, insulating wrappings applied longitudinally thereto in strips of such width that the edges of each strip do not overlap, successive strips being applied in such manner that the gaps or junctions do not coincide, an outer conductor of soft copper tape surrounding the insulated inner conductor and preferably applied in similar manner to said insulating wrappings, said outer conductor if completely surrounding a cross-section of said inner insulated conductor being provided with gaps or holes whereby impregnating fluid may be introduced, an insulating layer of wrappings surrounding said outer conductor and laid either helically or longitudinally, and a lead sheath surrounding said outer insulating layer and provided, if desired, by a final protective covering of jute, steel tape or the like.

LOCOMOTIVE BOILER FIREBOX.

138,294.—Locomotive Firebox Co.

Claim 1. In combination with a locomotive boiler firebox, including a crown sheet and side sheets, a water steaming and circulating element in the firebox and embodying therein at least one lower

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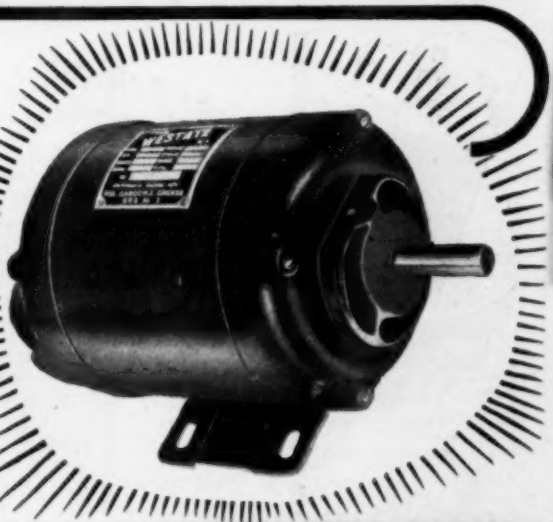

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S.A.: Radio Wholesalers Ltd., 24-26 James Place, Adelaide.
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South Australia: A. A. Mackwell & Sons, Adelaide.
Western Australia: A. Parkinson & Co., Perth.

inlet portion connected to one of said side sheets and a plurality of upper outlet portions operatively connected to said inlet portion, and opening through the crown sheet at spaced points arranged along a line extending diagonally of the crown sheet.

TRADE MARK APPLICATIONS

95,275. A design of the letters "PN". Electrical conduit fittings, fixture hangers, connectors, etc.—The Pyle-National Company, 1334 North Kostner Avenue, Chicago, Illinois, U.S.A.

94,874. "Enterprise." Heating and warming equipment for use in hot water systems.—Automatic Heating Appliances Proprietary Limited, 41 Park Street, South Melbourne, Victoria.

96,720. "Macshiel." Insulated sheet metal panels.—Ronald Malcolm MacDougall and Frederick Shields, c/o Shieldhall Engineering Co., 35 Hiles Street, Alexandria, N.S.W.

94,449. "Wesco." Caravans, trailers and chassis.—Westcott, Hazell & Co. Limited, 225 Castlereagh Street, Sydney, N.S.W.

94,502. "Beaver." Motor vehicles of all descriptions.—Leyland Motors Limited, Hough Lane, Leyland, Lancashire, England.

ALKALINE ACCUMULATOR

Plastics and metals combine to produce a light, tough accumulator. The normal types have various disadvantages: thus the lead acid cell is very heavy, and wears out quickly; the newer nickel-iron alkaline accumulator, is rugged and has a long life, but its weight and size limit its usefulness broadly to airge commercial vehicles.

An accumulator, without these shortcomings, and with many qualities of its own, has been evolved. Technically it belongs to the alkaline class, and is based on the silverzinc reaction.

One important feature is the absence of inert material in the electrodes: usually, these are "grid pasted" with substances playing no direct part in the electro-chemical reactions involved. In the Venner, both positive and negative electrodes form a homogeneous mass of active constituents. Furthermore, the electrodes are encased in a semi-permeable membrane, which acts both as dielectric and separator. This unit is fitted under slight pressure into a moulded perspex case, so that electrode buckling, short-circuiting and such like defects are avoided.

Most of the electrolyte is absorbed in the electrode assemblies, and special models with practically no free electrolyte can be supplied so that spillage risks are eliminated. Fire hazards are small, and topping up calls only for distilled water.

The new accumulator, less than half the size, and a third of the weight of a lead acid accumulator, is at present manufactured for very light weight uses such as hearing aids, models, miners' lamps, telephone equipment, etc. [2606].

TENDERS FOR PATENTS

The Proprietors of the following Australian Patents:—

Patent No. 120,586, dated 14th July, 1943, in the name of Corning Glass Works, for an invention entitled **"Improved Manufacture of Cast Refractory Products, particularly Blocks for Glass Melting Furnaces"**;

Patent No. 122,767, dated 15th April, 1944, in the name of Corning Glass Works, for an invention entitled **"Improved Manufacture of Organo Siloxanes"**;

and

Patent No. 117,505, dated 10th June, 1941, in the name of Corning Glass Works, for an invention entitled **"Organo Silicon Polymers and Methods of Making Them"**,

are prepared to dispose of the whole or part interest in the patents, or grant licenses on ROYALTY, and invite tenders in respect of same in order to fulfil the full requirements of the trade and the public.

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Fellows of the Institute of Patent Attorneys of Australia, Patent Attorneys, 37 Queen Street, Melbourne.

The Proprietors of the following Australian Patents:—

Patent No. 124,367, dated 22nd June, 1944, in the name of Corning Glass Works, for an invention entitled **"Treatment of Materials with Organo Silicon Compounds to render the Materials Water Repellent"**;

Patent No. 119,708, dated 2nd June, 1943, in the name of Corning Glass Works, for an invention entitled **"Improved Methods and Apparatus for Electric Glass Working"**;

and

Patent No. 119,628, dated 2nd June, 1943, in the name of Corning Glass Works, for an invention entitled **"Improved Glass Working Apparatus"**,

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Commonwealth Patents Nos. 125,666 and 125,313. The Patentees of these inventions desire that they be adopted and brought into commercial use and manufacture in Australia, and invite inquiries to this end from persons and firms interested.

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Ways to Lower Production

(Continued from page 62.)

1. **Electrode Size:** The selection of the size of electrode to be used is important, both to reducing the amount of deposited metal in the joint and to increasing the rate of depositing the metal needed. These desirable objectives are accomplished by:

(a) Increasing penetration.
(b) Decreasing arc time.

Fortunately, both of these can be done at the same time by taking full advantage of the natural force of the welding arc.

The effectiveness of the arc force is a product of the amount of welding current and the travel speed of the arc. An increase in current increases the arc force and penetration just as an increase in the volume of water through the same size nozzle increases the digging power of a stream of water. The increased arc force will be most effective, however, if the arc speed is fast enough to prevent a molten pool of metal from getting under the arc and absorbing the force of the arc. The arc must be directed against the base metal, and this is done by keeping the tip of the electrode ahead of the molten pool at all times, giving the arc force full opportunity to dig deep into the root of the joint.

In general, the larger the electrode it is possible to use, the lower the cost of the joint. Increasing the size of electrode used will decrease arc time and increase penetration. The rate of depositing metal is proportional to the current used. Metal cannot be deposited any faster than it can be melted off the end of the electrode. Increasing the current will increase the melt off rate and permit faster welding speeds. The increased current and the increased speed also produce greater penetration which makes a joint consisting of more fused plate metal and less deposited metal.

For example, with larger electrode and penetration deeper into the corner of a fillet weld, the arc force technique of welding reduces the cross sectional area of the deposited metal by 50 per cent., requiring 59 per cent. less man-hours to make the weld.

In a butt weld the arc force technique allows changing from a V butt joint in ¾ in. plate to a plain square edge joint, and cutting the amount of electrode metal deposited by 60 per cent. This in turn reduces the man-hours by 78 per cent.

Table II shows the relative cost of depositing 1 lb. of electrode metal with different size electrodes.

The skill of the operator plus the surface appearance requirements of the job will, in general, limit the amount of current that can be used on a given plate thickness with a given electrode.

2. **Electrode Type:** Certain variations in operating characteristics of different makes of electrodes will make a difference in the effectiveness of the arc force technique in securing greater penetration and greater speeds. Two ¼ in. electrodes of similar design but different makes can be tested under similar conditions and produce varying results.

The cost of operating the electrode may be influenced by slag covering characteristics which may slow welding speeds. Slag loss, slag removal, spatter loss, deposition efficiency and melting rate will also be important

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The type and make of electrode should be selected on its ability to make the most weld of a given strength in a given time. Depending on the type of joint and design, this electrode may be the best penetrating electrode or again it may be the electrode with the fastest melt-off rate.

3. **Polarity:** Better operating conditions may be obtained with one polarity over another. With electrode negative polarity, more heat is concentrated at the tip of the electrode and more electrode is usually melted off per minute than with electrode positive polarity. Also, greater penetration results. With electrode positive and work negative, the base metal or work is hotter than the electrode.

4. **Arc Length:** For most efficient position in welding, the shortest possible arc should be used. Wherever possible, the tip of the electrode coating should be kept in contact lightly with the plate, dragging the electrode along the joint. This prevents the heat and force of the arc from being dissipated into the surrounding air and increases the effectiveness of the arc force.

A short arc also reduces the arc voltage, and hence increases the welding amperage. Higher amperage can be secured without changing the setting of the machine simply by shortening the arc.

5. **Stub End Length:** The control of the length of the stub end of electrode which is not used is an effective means of cost reduction. This is a responsibility of both the welding operator as well as of plant management.

Labour cost per lb. of deposited metal increases with increased stub end losses due to greater number of interruptions and lower operating factor. Material costs or lb. of electrode per lb. of deposited metal increases, due to stub end waste. On the average, labour costs increase 3 per cent. for each 2 in. above the standard 2 in. stub end loss. For a 14 in. electrode with a 2 in. stub loss, 1.6 lb. are required to deposit 1 lb. of metal. With an 8 in. stub loss, the average requirement is 3.2 lb. of electrode for a deposited lb. of metal.

6. **Machine Efficiency:** A welding machine should be used which operates at maximum efficiency under the conditions existing with the majority of welding jobs to be done. Trying to use the efficient higher currents with too small a welder may offset cost reductions realized in the welding through inefficient welder operation. If the proper size machine is used, this will not be true as higher currents result in higher generator efficiencies. Also, some machines, have special features to permit more precise control of the welding arc to produce desired characteristics.

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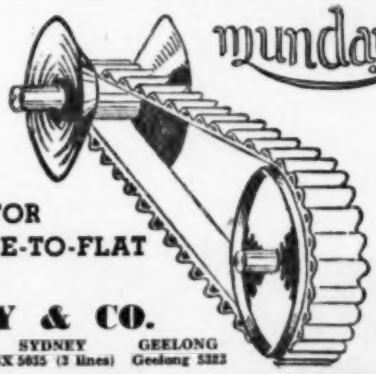

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Electric Hoists (File No. C.4/306/30). S. P. Morling, £6,120.

Electric Vegetable Peeling Machine (File No. C.4/307/319). Talents & Knapman Pty. Ltd., £2,140/1/4.

Communication Receiver (File No. C.4/316/134). British General Electric Co. Pty. Ltd., £265/4/-.

Oscillator (File No. C.4/316/134). Gilbert Lodge & Co. Ltd., £843/6/10.

Loudspeaker (File No. C.4/316/134). Amalgamated Wireless (A'asia.) Ltd., £1,100/19/-.

Geiger-Muller Counter (File No. C.4/316/150). Austronic Engineering Laboratories, £449/5/-.

Ground Signals (File No. C.4/201/38). Kenrite Canvas & Leather Goods Pty. Ltd., £256/9/8.

Greatcoats, G.S. (File No. C.4/252/23). R. Lapidos, £17,290.

Blouses, Battledress (File No. C.4/252/41). Fashion Modes Pty. Ltd., £7,817/5/-.

Plastic Sheeting, White (File No. C.4/266/261). Moulded Products Pty. Ltd., £1,031/5/-.

Mattresses, Bed (File No. C.4/267/33). John Lawler & Sons Pty. Ltd., £17,587/10/-, £35,175; John Wilson Ltd., £18,375; John Gilligan & Co. Ltd., £19,250.

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Scrubbing Brushes (File No. C.4/157/56). Australian Broom Co. Pty. Ltd., £633/15/-.

Distemper Brushes (File No. C.4/157/56). John Zevenboom & Co. Pty. Ltd., £978/11/1.

Felling Axes (File No. C.4/171/93). McPhersons Ltd., £186/14/-.

Ecclesiastical Equipment (File No. C.4/251/71). Church Stores, £1,097.

Jackets, Pyjama, Flannelette (File No. C.4/251/73). I. H. Jedwab & Sons, £1,067/6/11.

Ties, Silk and Cotton (File No. C.4/252/46). Australian Tie Co. Pty. Ltd., £409/10/-.

Shackle (File No. C.4/302/118). Northern Spare Parts Co., £374/1/3.

Pipe, Exhaust (File No. C.4/302/118). Dependable Accessories Pty. Ltd., £1,137/10/-.

Bearing Spring Shackle (File No. C.4/302/118). Stokoe Motors Pty. Ltd., £235.

Insert Inlet Valve (File No. C.4/302/118). Replacement Parts Pty. Ltd., £173/10/10.

Frame Battery Hold Down (File No. C.4/302/118). Dominion Motors, £93/15/-.

Circular, Mexican Fibre Hair-brushes (File No. C.4/313/37). Norman N. Benson, £54.

Optical Dividing Head (File No. C.4/313/268). William Adams & Co. Ltd., £818/7/6.

Sisalkraft, 5 ft. to 300 ft. (File No. 50/4731). F. W. Williams & Co. Ltd., £815/12/6.

"Capstan", Special Mild Cork Tipped Cigarettes (File No. 50/4947). W. D. & H. O. Wills (Aust.) Ltd., £1,434/12/7.

"Turf" Cork Tipped Cigarettes (File No. 50/4947). Carreras Ltd., £643/4/2.

Table Lamps (File No. 50/4066). Noyes Bros. (Aust.) Ltd., £3,235/1/4.

Electrical Equipment (File No. 50/4254). University Graham Instrument Co., £728/10/11.

Toilet Paper (File No. 50/4002). Paper Converting Co., £475/5/3.

"Dennis" 30 in. Petrol Driven Motor Mower (File No. 50/3966). Alex. A. Grahame, £250.

Cots, Wooden, complete with Wire Mattresses (File No. 50/4437). Dixie Cot Co., £210.

"Dennis" Motor Mower (File No. 50/2251). Alex. A. Grahame, £330.

Chests, Dressing, Wardrobes, Universal, Sideboards and Dining Tables (File No. 50/3609). Ogden Bros. Pty. Ltd., £1,703/1/8; Murray Bros. Pty. Ltd., £593/13/-.

Sheepskin Jackets (File No. 50/3794). A. L. Morris, £1,375.

Wax Floor Polish (File No. 50/4449). The Piccaninny Manufacturing Co., £1,133/6/8.

Paint (File No. 50/2916). Taubmans Ltd., £1,192/10/-.

Paint (File No. 50/4707). Smith & Gluyas Pty. Ltd., £890/3/6.

Medical Supplies (File No. 50/5250). Fawns & McAllan, £230.

THE MOST MODERN — ECONOMICAL — EFFICIENT — RELIABLE STEAM GENERATING PLANT. FOLLOW THE EXAMPLE OF HUNDREDS OF OTHER STEAM USERS, INSTALL A

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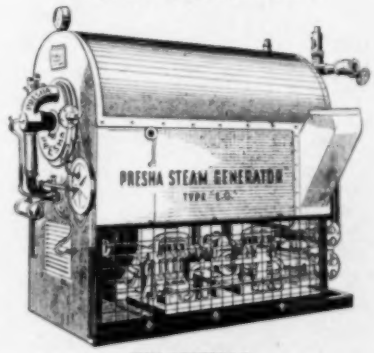

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Qld. Rep.: T. H. Martin & Co., Wilson House, 35 Charlotte St., Bris.
Victorian Rep.: A. E. Ackland Pty. Ltd., 406-414 P.O. Pl., Melb
W.A. Rep.: Radio and Associated Industries Pty. Ltd., 37 King St., Perth.
S.A. Rep.: Parsons & Robertson Ltd., 172-174 Pulteney St, Adel.

Durex Tape (File No. 50/4739). Perrot & Adams Pty. Ltd., £1,307/10/5.

Alclad Sheet (File No. C.4/371/363). Australian Aluminium Co. Pty. Ltd., £582/13/5.

Surgical Equipment (File No. C.-4/376/49). H. B. Selby & Co. Pty. Ltd., £66/19/4.

Wall Clocks (File No. C.4/170/7). Warburton, Franki (Melb.) Ltd., £73/4/-.

Wooden Coat Hangers (File No. C.4/170/7). L. A. Bowden, £817/19/2.

Paint (File No. C.4/178/61). Davison Paints Ltd., £145.

Undercoating (File No. C.4/178/61). Coverwell Paint Co. Pty. Ltd., £75/4/-.

Undercoating (File No. C.4/178/61). Taubmans Pty. Ltd., £65.

Raw Tung Oil (File No. C.4/178/96). Robert Bryce & Co. Pty. Ltd., £1,071/10/-.

Greatcoats, G.S. (File No. C.4/252/23). Downs Clothing Co., £6,420/16/8.

White Woollen Sweaters (File No. C.4/255/23). Haworth Knitting Mills, £398/10/-.

Fibre, Cot Mattresses (File No. C.4/266/256). Lullaby Bedding Co., £1,984/10/-.

Fuel Cocks (File No. C.4/301/90). Allison, Gray & Co., £219/16/-.

Gear Generator (File No. C.4/313/244). Gilbert Lodge & Co. Ltd., £7,963.

Resistors (File No. C.4/316/103). Australian Engineering Equipment Co. Pty. Ltd., £88/7/-.

Carrying and Multesters' Cases (File No. C.4/316/103). University Graham Instrument Co., £542/0/11.

Wind Vanes (File No. C.4/326/6). E. A. Machin & Co. Pty. Ltd., £388/10/-.

Washing Tubs (File No. C.4/350/21). John R. Bell & Co., £1,276/10/-.

Buckets (File No. C.4/350/51). John Fisher, Jnr., & Co., £271/7/7.

Aluminium Alloy Bar (File No. C.4/371/358). Gilbert Lodge & Co. Ltd., £70/15/2; Australian Aluminium Co. Pty. Ltd., £11,394/17/9.

Handkerchiefs, Cotton, White (File No. C.4/253/83). Pioneer Distributors Pty. Ltd., £5,400.

Wadding, Black, Glazed (File No. C.4/253/87). Cotton Dressings Pty. Ltd., £377/1/8.

Stockings, Football (File No. C.-4/255/29). H. W. Thompson, £290/9/4.

Tape, Blue, Worsted (File No. C.4/258/82). Webbing & Trimmings Pty. Ltd., £565/16/8.

Towels (File No. C.4/258/98). H. B. Dickie Ltd., £2,535.

Bedspreads, Barrack Single (File No. C.4/259/106). W. E. Bird Ltd., £12,456/10/-.

Interlining, Wool, Cotton and Hair (File No. C.4/259/107). Downs Coulter Pty. Ltd., £3,473/8/9.

Tea Towels, Linen (File No. C.-4/266/255). T. C. Beirne Ltd., £130; Manton & Sons Ltd., £1,193/10/-.

QUEENSLAND

BRISBANE CITY COUNCIL.

Water pipes, c.i., 6 in. dia., 20 miles, £48,088, F.O.W., Brisbane; 4 in. dia., 20 miles, £38,592, F.O.W., Brisbane, Australia-Middle East Trading Co.

Utility truck, Ford, coupe, 10 cwt. cap., £855; chassis and cab, 4½ ton, 157 in. w.b., Ford, £900. Metropolitan Motors Pty. Ltd.

WEST AUSTRALIA

TENDER BOARD.

Undercarriages, caravan, three sets, £37/17/6 per unit. United Motors.

Air cooled petrol engine, MR 25 Villiers 4-cycle; 1 in. x 2-stage Titan centrifugal pump, £75. Harris Scarfe & Sandovers Ltd.

Steelwork, £31,092. Forwood Down (W.A.) Pty. Ltd.

Carrier telephone equip. and associated apparatus, three channel, at rates. Communication Engineering Pty. Ltd.

Cast iron and m.s. fittings, item 1, £7/11/6 ea.; item 2, £9/5/- ea.; item 3, £4/3/6 ea.; item 4, £1/13/6 ea.; item 5, £1/11/- ea.; item 6, £4/19/6 ea.; item 7, 8d. ea.; item 8, £1/7/ ea.; item 9, £1/2/1 ea.; item 10, 9/3 ea.; item 11, £1/18/- ea.; item 12, £1/12/5 ea.; item 13, £3/19/8 ea.; item 14, £3/17/9 ea.; item 15, £5/6/- ea.; item 16, £3/10/7 ea. Forwood Down (W.A.) Pty. Ltd.

DATA RULE SIMPLIFIES CALCULATIONS

A plastic data rule has been developed for the use of electrical designers to simplify calculations involved in the re-design of apparatus. The new computer is 12 in. long and is provided with a leather carrying case. A 46 page book of instructions, written by the inventor, is also included. The data rule does not eliminate the need for basic knowledge but is offered to assist the engineer in checking design and in performing numerical chores.

In making a frequency change the rule will determine the number of turns needed, the resulting resistance in ohms, the size of wire needed, what voltage can be applied at the new frequency, and the new idle amperage. For a voltage change, the data rule will determine the number of turns required, the resulting resistance in ohms, the size of wire, connection data, change in torque, the new idle amperage, and what size capacitor is necessary. In making a change in turns, the rule will give the amperage, the resistance in ohms, the size of wire needed, the new idle amperage, and the change in torque. The number of turns and the size of wire needed are shown for a connection change. The required number of turns is given for a speed change. For a wire change, the data rule shows the resulting resistance in ohms.

The new computer is designed to minimize formula memorizing and textbook research. Instantaneous answers are given with accuracy claimed to the ampere-turn. [2591].

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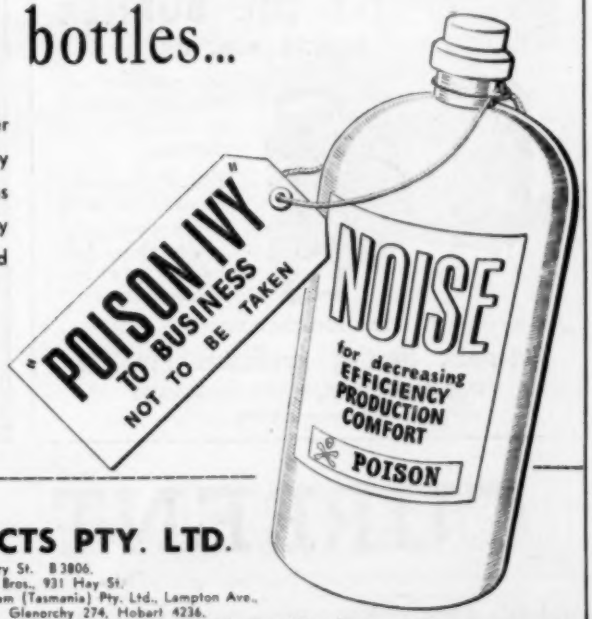

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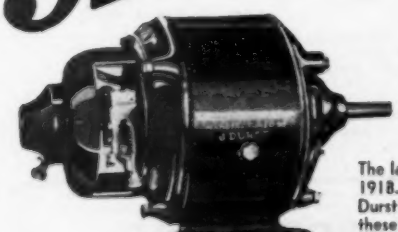

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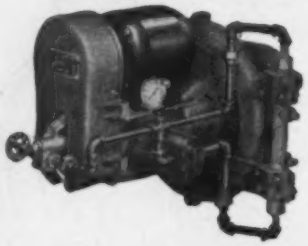

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CURRENT TENDERS

NEW TENDERS

The following tenders have been called since our last issue. Current tenders which have been published in previous issues follow this section.

COMMONWEALTH

DEPARTMENT OF CIVIL AVIATION.

Mobile Cranes, 5-ton (Sch. 323). Dec. 19.

Tubular Steel Masts or Component Parts, for Rhombic Aerials (Sch. 314). Extended to Jan. 16.

DEPARTMENT OF WORKS AND HOUSING.

Evaporative Cooling and Heating Plant (Spec. 351); **Exhaust Hood for Kitchen** (Spec. 352); **Refrigeration Equipment** (Spec. 353); **Hot Water Systems and Steam Reticulation** (Spec. 354); **Exhaust Hood for Kitchen** (Spec. 358); **Refrigeration Equipment** (Spec. 359); **Steam Equipment** (Spec. 362); **Steam Equipment** (Spec. 364); **Hot Water Systems and Steam Reticulation** (Spec. 365); **Evaporative Cooling and Heating Plant** (Spec. 366), **for Central South Australia.** Jan. 9.

Furnishings: (Curtains; Blankets; Occasional Furniture; Carpet Squares; Rubber Flooring; Dining-room Furniture; Bedroom Furniture), for Students' Hostel, Forestry School, Canberra. Dec. 19.

Hot Water, Gas, Compressed Air and Vacuum Services at Fisherman's Bend. Dec. 19.

Jacket Water Cooling Equipment, for 70 K.W. Diesel Generating Sets, for Darwin. Dec. 18.

Transformers. Jan. 2.

GOVERNMENT RAILWAYS DEPARTMENT.

Pneumatic Tyres and Tubes. Dec. 12.

Rails and Fishplates, 94 lb. Jan. 16.

POSTMASTER-GENERAL'S DEPARTMENT.

Printed Forms, Wireless Branch Series (Sch. C.6481). Jan. 16.

STORES SUPPLY AND TENDER BOARD.

Cheque Paper (Sch. C.T.B. 937). Dec. 12.

Firefighting Equipment (Sch. C.T.B. 929). Dec. 19.

Office Knives and Scissors (C.T.B. 932). Jan. 16.

NEW SOUTH WALES

DEPARTMENT OF PUBLIC WORKS.

Bed-Passenger Lift, Electrically Operated, with Sundry Items, for Future Lift, for Bega District Hospital. Dec. 11.

Bucky Tilt Table, Tube Stand, and Accessories, for Royal Prince Alfred Hospital, Camperdown. Feb. 12.

Electro Cardiograph. Dec. 15.

Goods Lift, Electrically Operated, for University of Technology, Kensington. Jan. 8.

Machine Tools, for Workshop at Southern Electricity Supply, Tallawarra Power Station. Jan. 8.

Mobile X-Ray Unit and Accessories. Feb. 5.

Mobile X-Ray Unit and Accessories, for Narrandera District Hospital. Feb. 5.

Thermometer Pockets. Dec. 20.

Three-Wheel Type Tractors. Dec. 20.

DEPARTMENT OF SUPPLY.

Automatic Boiling Water Units. Dec. 14.

Brass Condenser Tubes, 18,200, Purchase of. Dec. 12.

Enamel and Lacquer. Dec. 12.

FORESTRY COMMISSION.

Mortice Locks, 3½ in., with Furniture. Dec. 12.

(Turn to page 77.)

NICHROME

RESISTANCE WIRE

THE WORLD'S BEST

Made in England SOLE AUSTRALIAN AGENTS:

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NEW TENDERS — Contd.

GOVERNMENT RAILWAYS DEPARTMENT.

Indicating and Recording Instruments, Summation and Remote Metering Protective Relays, Regulating and Rheostat Equipment, and Current Transformers, for Lake Macquarie Power Station (Spec. 1276). Extended to Jan. 10.

Isolating Switches, Outdoor, Manually and Power Operated,

◆ ◆ SEE ALSO ◆ ◆
"LATE OPEN TENDERS"

Air Break, three pole and single pole, with current ratings, 300-1,200 amperes, at voltages 33 KV to 132 KV, for Lake Macquarie Power Station, Carlingford, Waratah and Strathfield (Spec. 1270). Extended to Dec. 13.

Truck Weighbridges, 35-ton (18), with platforms 10 ft. long by 6 ft. 6 in. wide, equipped with dial indicators and recording heads. Extended to Jan. 10.

METROPOLITAN WATER, SEWERAGE AND DRAINAGE BOARD.

Concrete Buckets (6) of rated capacity at least 4 cub. yds. (P.T.-392). March 6.

Road Tractor Unit, Two-Axle, powered by Compression Ignition Engine capable of developing 100 B.H.P. (P.T. 388). Dec. 19.

Road Tractor Units, Three-Axle (two), powered by Compression Ignition Engine, capable of developing 120 B.H.P. (P.T. 389). Dec. 19.

STATE CONTRACTS CONTROL BOARD.

Calculating Machine. Dec. 12.
Electric Drilling Machine. Dec. 11.
Electrical Meters. Dec. 11.
File Traymobile. Dec. 12.
Optical Supplies. Dec. 11.
Portable Pump Units. Dec. 11.
Scientific Apparatus. Dec. 11.

SYDNEY COUNTY COUNCIL.

Overhead Transmission Line (132,000 Volt.), Lugarno to Homebush (Spec. 1493). March 15.

MISCELLANEOUS.

Outdoor Transformers, up to and including 1,500 KVA cap., for Newcastle City Council. Jan. 22.

Power Grader, medium weight (14,000 lb. to 16,000 lb., for Shire of Coreen. Dec. 21.

Submarine Power Cable, 33,000 Volt., for Newcastle City Council. Extended to Jan. 2.

VICTORIA

CITY OF MELBOURNE.

Electricity Meters. Jan. 8.

DEPARTMENT OF SUPPLY.

Bicycle Spare Parts. Dec. 12.
Cathode Ray Oscillographs. Dec. 12.
Condensers and Resistors. Dec. 14.
Electronic Test Equipment. Dec. 21.
Food Mixers and Mincing Attachments. Dec. 14.
Lathe and Equipment. Dec. 14.
Precision Grinding Machines. Dec. 21.
Plate Rolling Machine. Dec. 21.
Science Equipment. Dec. 12.
Steel Washers. Dec. 14.
Tools and Gauges. Dec. 21.
White Blankets. Dec. 12.
Wireless Masts. Dec. 19.

DEPARTMENT OF PUBLIC WORKS.

Kerosene Hot-water Service, for Lorne. Dec. 19.
Pumping Set, for Healesville. Dec. 19.
Septic Tank and New Water Service, etc., for State School, Healesville. Dec. 12.

GOVERNMENT RAILWAYS DEPARTMENT.

Flashing Light Highway Crossing Signals. Jan. 10.

(Turn to page 78.)

ADVANX WILL SOLVE YOUR PROBLEMS IN RUBBER

ADVANX RUBBER & TYRE CO. PTY. LTD., NEILD AVENUE, RUSHCUTTERS BAY, SYDNEY, AUSTRALIA, 'PHONE FA 8101.

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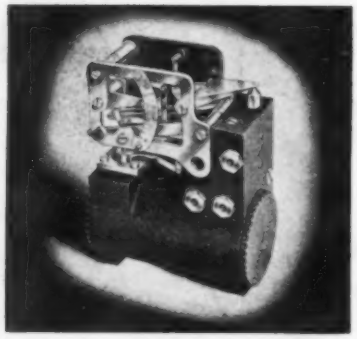

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NEW TENDERS — Contd.

MELBOURNE AND METROPOLITAN BOARD OF WORKS.

Armoured Cable, Flexible Trailing Cable and Copper Conductors. Dec. 19.

Bench Grinder, 8-in. Type, with ½ and 1 H.P. Motor. Dec. 13.

Chain Cutter and Hollow Chisel Mortising Machine, with 2 and 4 H.P. Motors. Dec. 13.

Equipment, for Field Servicing of Mobile Construction Plant, with Oils, Grease, Fuels, etc. Dec. 19.

Faucet Sluice Valves (25), 5 in. dia. Dec. 19.

Motor-driven Circular Saw Bench, 26 in., with 10 H.P. Motor. Dec. 13.

Pendulum Crosscut Saw, with 3 or 5 H.P. Motor. Dec. 13.

Thicknessing Machine, with 7½ H.P. Motor, 20 in. or 24 in. Dec. 13.

STATE ELECTRICITY COMMISSION.

Polyphase A.C. Kilowatt Hour Meters. Jan. 3.

Portable Generating Set. Jan. 20.

Sleeper Plates, for Movable Rail and Dredger Tracks. Dec. 13.

Steel Cored Aluminium Conductor. Feb. 28.

MELBOURNE HARBOUR TRUST COMMISSION.

Gunmetal Castings, for 150 Telephone Housings. Dec. 15.

MISCELLANEOUS.

Fork Lift Trucks (2), cap., 13,000 lb. to 17,000 lb., to a height of not less than 10 ft., powered preferably with Diesel engine, for Snowy Mountains Hydro-Electric Authority. Dec. 12.

Front-End Loader, for Shire of Rosedale. Dec. 18.

High Tension Transformers, 22,000-volt., for Shire of Kerang. Jan. 15.

New Crawler Tractors (6), 40 to 60 Drawbar H.P., at Sea Level, powered by Diesel Engine, for Snowy Mountains Hydro-Electric Authority. Dec. 19.

QUEENSLAND

DEPARTMENT OF PUBLIC WORKS.

Passenger Lift, for new Government Offices, Rockhampton. Jan. 17.

GOVERNMENT RAILWAYS DEPARTMENT.

Low-sided Steel Goods Waggons (1,000), Class "FJS". Jan. 31.

STATE ELECTRICITY COMMISSION.

Coal Burning Gas Producers (3), (Spec. 227). Jan. 31.

STATE STORES BOARD.

Mild Steel Angles, Plate and Flats (Tender A.165). Jan. 4.

MISCELLANEOUS.

Fabricated Structural Steel Towers (Spec. 197/50), for Townsville Regional Electricity Board. Extended to Jan. 15.

TASMANIA

HYDRO-ELECTRIC COMMISSION.

Complete Cableway Head Tower Travelling Winch, and a Complete Tail Tower Travelling Winch (C.E. 230). Jan. 24.

CURRENT TENDERS

The following tenders have appeared in previous issues and are still current.

COMMONWEALTH

POSTMASTER-GENERAL'S DEPARTMENT.

Attendance Books (Sch. C.6476). Dec. 19.

B.P.O. Standard Uniselector Maintenance Parts (Sch. C.6426). Jan. 16.

Bimotional Switch Wiper Assemblies and Parts (Sch. C.6436). Dec. 19.

Broadcasting Transmitters, Radio Telephone (Sch. C.6435). Dec. 14.

Cable Jointing Pits and Covers (Sch. C.6473). Dec. 19.

Coil Winding Wire (Sch. C.6531). Dec. 19.

Communication System between Sydney and Melbourne (Spec. C.8157). Extended to Jan. 18, 1951.

Copper Tapes (Sch. C.6467). Dec. 14.

Electrical Indicating Meters (Sch. C.6421). Dec. 12.

High Frequency Radio Telephone Subscribers' Equipment (Sch. C.6435). Dec. 14.

Printed Forms, "Postmaster, P.M." Series (Sch. C.6478). Dec. 14.

Printed Forms, "Statistical" Series (Sch. C.6477). Dec. 19.

Protective Apparatus (Sch. C.6462). Jan. 23.

Record Replay Equipment (Sch. C.6469). Dec. 19.

Resistors and Reactances (Sch. C.6437). Dec. 19.

Rubber Gloves (Sch. C.6474). Jan. 16.

Rust Preventive (Sch. C.6470). Jan. 18.

Spanners (Sch. C.6434). Dec. 19.

Submarine Telephone Cable (Sch. C.6468). Jan. 18.

Tools-Adjusters and Benders (Sch. C.6429). Dec. 14.

(Turn to page 79.)

CURRENT TENDERS – contd.

Winches and Power Take-off (Sch. C.6471). Feb. 15.

DEPARTMENT OF CIVIL AVIATION.

Airport Rotating Light Beacons (Sch. 307). Extended to Dec. 12.

Dual Diversity Communication Receivers (Sch. 318). Dec. 19.

Electric Propellor Fans. Dec. 19.

Fuses, for Radio and Radar Equipment (Sch. 310). Jan. 16.

Hand Tools, for Adjusting Telephone Equipment (Sch. 317). Jan. 16.

Headphones, for Telecommunication Equipment (Sch. 320). Jan. 23.

High Intensity Approach Light Fittings (Sch. 306). Dec. 12.

Master Time Clock Systems and Associated Slave Equipment. Jan. 30.

Switchboards, for D.M.E. Installations. Dec. 19.

AUSTRALIAN ALUMINIUM PRODUCTION COMMISSION.

Air Compressors (2), 600 C.F.M. (Spec. M29). Dec. 11.

Cold Cutting Saw, for Aluminium Billets, and Saw Sharpener (Spec. M.32). Jan. 15

Grinding Media, 45 tons—Forged Steel Balls (No. M.30). Dec. 18.

Fans (16), 50,000 cub. ft. per minute (Sch. M.33). Jan. 15.

Master Clock Time System, with Attendance Recorders and Wall Clocks (Spec. E.31). Dec. 15.

Mild Steel Water and Air Piping, 6 in. dia. to ¼ in. dia. (Spec. M.34). Jan. 22.

Steam Driven, Direct Acting Molten Pitch Pumps (three), (No. M.31). Dec. 18.

DEPARTMENT OF WORKS AND HOUSING.

Boiling Pans (3), 30-gallon, for Capital Hill No. 2 Works Hostel, Canberra. Dec. 19.

Coal Handling Plant, for Heidelberg. Dec. 19.

Counter Type Refrigerator, for Ainslie Infants' School, Canberra. Dec. 19.

Dust Extraction Ductwork, for Heidelberg. Dec. 19.

Electrical Passenger Lifts (4), and Electric Goods Lift, for Melbourne. Dec. 12.

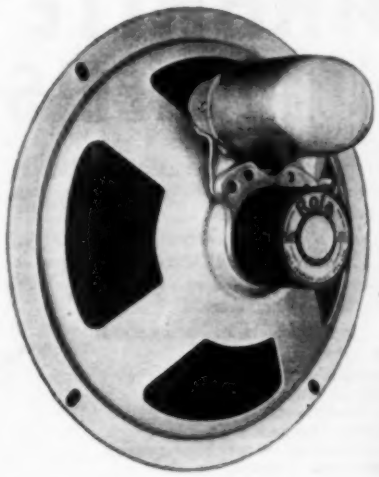
Gyratory Type Fine Reduction Stone Crushing Machine, for Canberra. Dec. 12.

High Tension Underground Cable and Joint Boxes, for Canberra. Jan. 9.

Hot Water Service, for Portsea. Dec. 19.

Indoor Ring Main Units, for Electricity Supply, Canberra. Extended to Dec. 19.

(Turn to page 80.)



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CURRENT TENDERS — contd.

Low Tension Ironclad Switchboards, for Canberra. Jan. 9.

Low Tension Underground Cable and Joint Boxes, for Canberra. Jan. 9.

Oil Storage Tanks, for Hostels, Canberra. Dec. 12.

Outdoor High Tension Switchgear, for Electricity Supply, Canberra. Extended to Dec. 19.

Metal Lathes, 4¼ in. (2) and Accessories, for Canberra High School. Dec. 12.

Pneumatic Tyred Rollers (3), 30-40 ton, for various States. Dec. 12.

Steel Door Frames and Aluminium Doors, Supply and fix, for Administrative Offices Building, Canberra. Dec. 12.

Stone Planing Machines (4), for Stone Yard, Canberra. Dec. 12.

GOVERNMENT RAILWAYS DEPARTMENT.

Diesel Electric Locomotives, 3 ft. 6 in. Jan. 9.

DO YOU USE OUR INQUIRY DEPARTMENT
SEE PAGE 40

Horizontal Boring Machine. Dec. 12.

Sleeping Cars. Dec. 12.

STORES, SUPPLY AND TENDER BOARD.

Cotton Tape (Sch. C.T.B. 916). Dec 19.

Postage Stamp Paper (Sch. C.T.B. 927). Jan. 18.

STATES

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GOVERNMENT RAILWAYS DEPARTMENT.

Air Break Isolating Switches (241), Outdoor Manually and Power Operated; current ratings, 300-1,200 amperes at voltages 33 k.v. to 132 k.v. (Spec. 1270). Extended to Dec. 13.

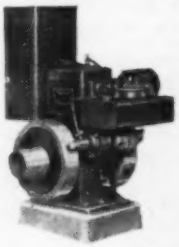
Automatic Ash Skip Hoist and Horizontal Belt Ash Conveyors (2), for Ultimo Power Station (Spec. 1272). Jan. 17.

Axles, for Locomotives, Tenders and Carriages (Sch. 133). Dec. 31.

Circulating Water Screening Plant, for Lake Macquarie Power Station (Spec. 1277). Dec. 20.

Overhead Wiring Equipment, for the Electrification of Railways Tracks. Jan. 24.

(Turn to page 81.)



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CURRENT TENDERS – contd.

Rolled Steel Tyres, for Locomotives, Tenders, Carriages and Waggons (Sch. 131). Dec. 31.

Sawdust, Annual Contract (Sch. 146). Dec. 31.

Wood Planing and Moulding Machine (CE-1704). Dec. 12.

DEPARTMENT OF PUBLIC WORKS.

Bench Drills, Grinder, etc. Dec. 15.

Electrically Driven Pumping Plant, for Walcha Water Supply. January 22.

Electrically - driven Borehole Type Pumping Plant, for Coonamble Water Supply. Jan. 15.

Electrically - driven Pumping Plant, for Dorrigo Water Supply. Jan. 29.

Electrically-driven Bore, for Mendooran Water Supply. Jan. 15.

Hacksaw Blades. Dec. 13.

Jackhammers. Dec. 13.

Mounted Diesel H.D. Crane. Dec. 13.

M.V.A. Transformers (2), 132/66/11 K.V., 27.5, No. E.4/50151, for Southern Electricity Supply. Extended to Dec. 11.

Portable Air Compressors. Dec. 13.

Portable Electric Blower. Dec. 15.

Power Hacksaw, Bandsaw, Finisher Table. Dec. 13.

Pumping Plant—Deep Well Type, Electrically Driven, for Cooma Water Supply. Dec. 13.

Pumping Plant—Bore Hole Type, Electrically Driven, for Mendooran Water Supply. Jan. 15.

Steel—Angles and Flats, approx. 9 tons. Dec. 20.

Sucker and Blower Unit. Dec. 15.

Water Softener. Jan. 3.

DEPARTMENT OF SUPPLY.

Thimbles. Dec. 12.

White Hospital Blankets, 1,100. Dec. 12.

MARITIME SERVICES BOARD.

Marine Type, Multitubular Boiler, approx. 10 ft. dia. x 10 ft. long (Con. 50/53). Jan. 2.

Structural Steelwork, totalling 385.5 tons, for Shed at Pyrmont (Con. 50/42). Jan. 8.

METROPOLITAN WATER, SEWERAGE AND DRAINAGE BOARD.

Centrifugal-type Pumping Units, electrically-driven, for Bonnyrigg Pumping Station (Con. 2451). Dec. 12.

Concrete Skips, Bottom Discharge (30), 20 cub. ft. cap. (P.T. 387). Jan. 9.

Mild Steel Plate, approx. 2 tons of each size, ¼ in. ⅜ in., ½ in., ⅝ in., and 1 in. (Quot. 8287). Dec. 11.

Ropeway Loading Bins (2), and Supporting Steelwork, at McCann's Island (Job 2460). Dec. 19.

Steel Silo, 820 tons cap., at Warragamba Dam (Job 2453). Dec. 19.

Vertical Spindle Centrifugal-type Sewage Pumping Units, electrically driven, for low level Pumping Station, No. 119 (Con. 2965). Dec. 12.

SYDNEY CITY COUNCIL.

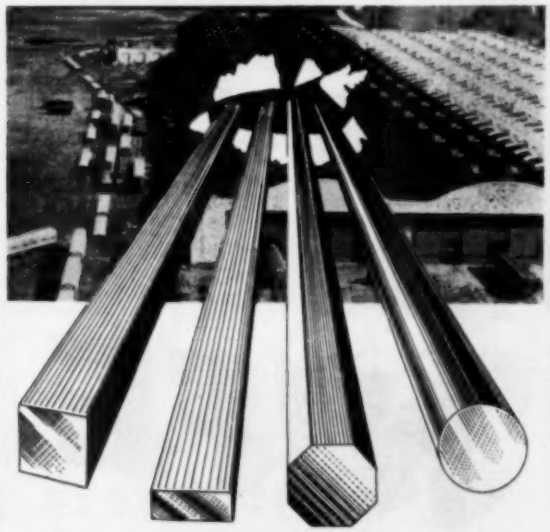
Steel Reinforcing Bars, approx. 54 tons. Dec. 11.

SYDNEY COUNTY COUNCIL.

Circuit Breaker Switching Equipment, low voltage, air or oil (Spec. 1456). Jan. 18.

Metalclad Neutral Switching Equipments, 20,000 volt., for Homebush Sub-station (Spec. 1486). Jan. 18.

(Turn to page 82.)



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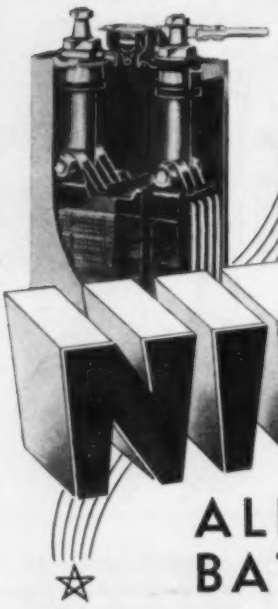

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CURRENT TENDERS — contd.

Miscellaneous Mild Steel Welded Tanks, for Nos. 20 and 21 units at Pyrmont "B" Power Station (Spec. 1491). Dec. 14.

Miscellaneous Piping, for Turbo Alternators at Pyrmont "B" Power Station (Spec. 1468). Extended to Jan. 18.

Supervisory Control Equipments, for City North Sub-station and City Sub-station (Spec. 1457). Jan 18.

MISCELLANEOUS.

Metal-Clad Switchgear, 11,000-volt, and L. T., for Clarence River County Council (Spec. 95/50). Dec. 20.

Motor Truck, 3 to 4 tons, equipped with body of 3 cub. yd. cap., and hoist for road maintenance work, for Municipality of Maclean. Dec. 11.

Pumping Plant, deep-well type, electrically-driven, for Cooma Water Supply Augmentation (Spec. 120-49/50). Dec. 18.

Pumping Plant, electrically-driven Bore Hole Type, for Mendooran Water Supply (Spec. 114-49/50). Jan. 15.

Tracked Tractor, 40 h.p.; Front or Overhead Loader Attachment; Dozer Blade Attachment, for City of Tamworth. Dec. 12.

Venturi Meter, for Water Supply Piping at Tomago (Con. 696). **Hunter District Water Board.** Dec. 12.

VICTORIA

GOVERNMENT RAILWAYS DEPARTMENT.

Bulkhead Watertight Fittings. Dec. 13.

Circuit Controllers, for Point Layouts. Jan. 17.

Engine-driven Electric Welding Outfit. Dec. 13.

Gravel Ballast loaded into trucks at Stratford. Dec. 13.

High Voltage Test Set. Dec. 13.

Lamp Fittings. Dec. 13.

Panel Vans. Dec. 20.

Portable Huts, 10 ft. x 8 ft. Dec. 20.

Semi-Automatic Welding Plants. Jan. 10.

Shaping Machines. Dec. 20.

CITY OF MELBOURNE.

Air Circuit Breakers and Current Transformers (Spec. 740/E). Extended to Dec. 14.

DEPARTMENT OF PUBLIC WORKS.

Electric Hot-water Service, for Greensborough. Dec. 12.

Fuel Hot-water Service, for State Schools, Gonn Crossing. Dec. 12.

Kerosene Hot-water Service, for Consolidated Schools, Red Hill. Dec. 12.

Wireless Broadcast Receiver, together with two 7 in. Loud-Speakers, for Melbourne. Dec. 12.

DEPARTMENT OF SUPPLY.

Radio Plant and Equipment. Dec. 19.

MELBOURNE AND METROPOLITAN BOARD OF WORKS.

Hydraulically Operated Tilt and Angle Dozer Attachment to D.D.H. Tractor. Dec. 19.

Portable Air Compressors (6). Dec. 19.

Tractor, with Rotary Cutting Attachment. Dec. 19.

Tyres and Tubes, for Motor Trucks, Graders, Cranes and Scoops. Dec. 19.

MELBOURNE HARBOUR TRUST COMMISSION.

Bulldozer. Jan. 19.

Crawler Crane, 7½ ton. Jan. 19.

Footpath Roller, 35-40 cwt. Jan. 19.

Fork-lift Trucks. Jan. 19.

MELBOURNE AND METROPOLITAN TRAMWAYS BOARD.

Portable Concrete Mixer (Tender 1609). Dec. 18.

STATE ELECTRICITY COMMISSION.

Automatic Telephone Instruments (Spec. 50-51/176). Jan. 24.

Copper Conductors, Jointing Sleeves and Trolley Wire (Spec. 50-51/177). Dec. 13.

Heavy Duty Scrub Clearing Machine (Spec. 50-51/178). Dec. 20.

Paper and Varnished Cambric Insulated Cable. Feb 7.

Plate Girder Bridges. Extended to Dec. 13.

Service Entrance Cable (Spec. 50-51/185). Dec. 13.

Switchgear and Accessories, 6,600-V. (Spec. 50-51/180). Feb. 14.

Telephone Cable Loading Coil Assemblies (Spec. 50-51/174). Jan. 31.

Teleprinter Machines (Spec. 50-51/119). Jan. 17.

Toroidal Iron Dust Cores (Spec. 50-51/175). Jan. 24.

Traction Batteries (Spec. 50-51/181). Dec. 20.

Transformers and Spares (two). (Spec. 50-51/168). Feb. 7.

STATE RIVERS AND WATER SUPPLY COMMISSION.

Lathe, 6-in., with electric motor drive. Dec. 12.

Well Point De-watering Equipment, for Heyfield. Dec. 12.

MISCELLANEOUS.

Crawler Tractor, 30-40 h.p.; Power Grader, 1, 2, or 3 yard scoop, on Rubber Wheels; Caravan, suitable road work; Tents, for Shire of Huntly. Dec. 11.

Power Grader of approx. 35-h.p., for City of Nunawading. Dec. 11.

Spun Cast-Iron or Asbestos Cement Pressure Pipes; Valves; Cast-Iron Specials, for Municipality of Fingal. Dec. 16.

QUEENSLAND

BRISBANE CITY COUNCIL.

Circulating Water Pumps, for Tennyson Power House. Jan. 12.

(Turn to page 83.)

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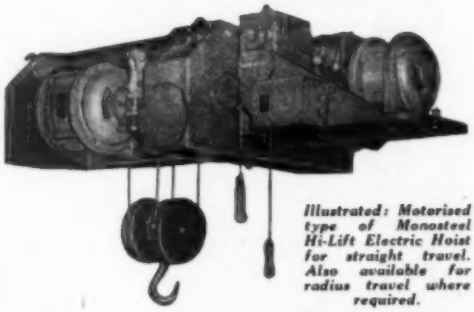

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CURRENT TENDERS – contd.

Electrical Potentiometer; Four-point portable temperature recorder. Jan. 17.

Lightning Arresters (Con. E.24/1950). Dec. 15.

Mechanical Circulating Water Screens, for Tennyson Power House. Jan. 12.

Porcelain Insulators and Hardware (Con. E.25/1950). Jan. 12.

Salt Glazed Ware Pipes and Fittings (Con. W79/1950). Dec. 22.

Storage Reservoir (one million gallon), at Grovely (Con. W82/1950). Dec. 22.

DEPARTMENT OF PUBLIC WORKS.

Crane, 15 ton, hand-operated. Dec. 18.

Overhead Travelling Crane, hand-operated, 15-ton, for Hydro-Electric Power House, Somerset Dam. Dec. 18.

STATE ELECTRICITY COMMISSION.

Evaporator, for Boiler Feed Makeup (Spec. 250). Jan. 24.

Main Transformers, 132, 66, 22, 11 and 5.5 kV. (Spec. T/F.2). Dec. 13.

Oil Circuit-Breakers, 66kV, for Sub-Stations (Spec. 218). Feb. 21.

Prefabricated Timber of Metal Frames Buildings (Spec. 248). Jan. 10.

Switchgear: (132, 66, 22, 11 & 5 KV), Relays and Carrier Current Communication Equipment (Spec. T.F./3). Extended to Jan. 17.

Wood Burning Gas Producers (Spec. 247). Dec. 20.

STATE STORES BOARD.

Bolts and Nuts, for various Government Departments (Tender A.162). Dec. 19.

Structural Steel, etc. Dec. 18.

MISCELLANEOUS.

Plan Printing Machines, for Cairns Regional Electricity Board (Con. L50/21). Jan. 23.

Switchgear, 22,000 and 6,600 volt., for Cairns Regional Electricity Board (Con. L.50/20). Dec. 13.

Switchgear, for Cairns Regional Electricity Board (Spec. L.50/17). Extended to Jan. 17.

SOUTH AUSTRALIA

SUPPLY AND TENDER BOARD.

Pipes, c.i., spun, 27,000 tons. Dec. 18.

Crane, electric overhead travelling, 25 ton, with 5 ton auxiliary hoist. Dec. 11.

WEST AUSTRALIA

GOVERNMENT TENDER BOARD.

Automatic Telephone Exchange (Sch. 529A). Dec. 14.

Cast Manganese Steel Railway Crossings. Dec. 21.

Electric Pumping Equipment, for Albany. Dec. 14.

Fishplates, for the Railways (Sch. 608a). Dec. 21.

(Turn to page 84.)

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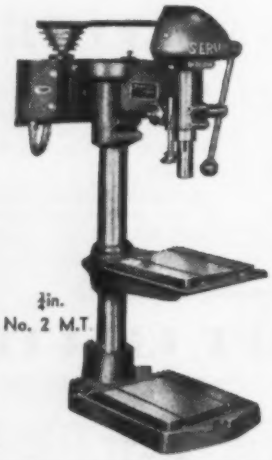

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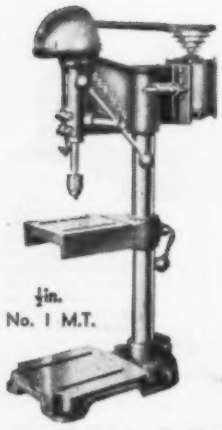

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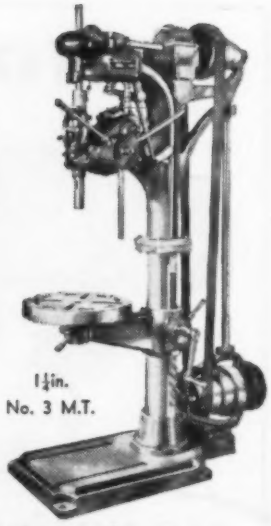

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SEE PAGE 40

THE NATURE OF BANKING

Review of Business Conditions

In his review at the recent Annual General meeting of shareholders of the Bank of New South Wales, the President of the Board, Mr. Martin McIlrath, made the following points:—

PRODUCTION in Australia is in the hands mainly of a host of small producers and is subject to great variations in business and seasonal conditions. The banking structure has developed accordingly along flexible, efficient and competitive lines. Within the

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NOTE: The removed GLOSCOAT can be remelted repeatedly for further use.

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- GLOSCOAT *in one operation completely preserves and protects.*
- GLOSCOAT *is easy to apply and simple to remove.*
- GLOSCOAT *eliminates preservatives and desiccants.*
- GLOSCOAT *reduces bulk of packed articles, an important consideration if transmitted by air freight. Parts coated are ready for immediate use when received, as no degreasing is necessary.*

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bounds of national interest there has been freedom to meet the legitimate needs of enterprise. We must beware lest the effort to create a Government monopoly in finance be replaced, owing to lack of vigilance, by a tendency to substitute rigidity for flexibility and to develop controls to the extent that they affect efficiency and enterprise. We should not overlook the fact that, while competition is desirable, it should be absolutely fair. In the present approach to existing financial problems there is a danger that the whole nature of banking may be constricted, to the ultimate weakening of the economic structure.

Australia's present problems do not arise principally out of the high returns of her export industries, as many people seem to imagine. They lie deeper than that. In general they stem from over-optimism on one hand, and indifference on the other.

Judging from the rate of voluntary migration and transfer of capital for investment, local optimism for the future of Australia is shared by the rest of the world. But, in addition, there is a strong urge in this country to push on with the rapid development and exploitation of natural resources without a full realization either of the obstacles or of the sacrifices entailed.

At the other extreme, there is a seeming indifference to the efforts required to achieve these objectives. Thus the rate of output attained in existing industries is far below its potential, not merely because of shortages of labour or materials, but also because of the existence of restrictive labour practices and of incessant interruptions brought about for political ends. The level of efficiency in industry is restrained on one hand by the conservatism or irresponsibility of many trade union leaders and on the other by lack of incentive to enterprise in management, and often by excessive paternalism on the part of the State.

Between these influences, the desire for speedy development and the lag in execution, the economy has become over-extended, and this is the basic reason for present inflationary trends.

In the circumstances we must recognise that governmental investment programmes are excessive and the very scale of the current flow of migrants is adding to inflation. As a general principle and as a more practical proposition, Australia for the time being should concentrate not so much on developmental projects which promise results in the distant future, but on those highly necessary tasks of maintenance and restoration of existing capital to its maximum efficiency.

If we think in terms of public transport, roads, electricity generation, and of farm improvement and greater mechanization in mines and factories, there is a vast amount of work to be done which will return greater production in a shorter time than many of the long-term projects now contemplated. In this period of inflation,

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apart from defence requirements we need to concentrate efforts on what is immediately productive.

PRIMARY INDUSTRIES

While the primary producer can find little to criticize in the demand for his output, he has many difficulties with which to contend. Costs of production are steadily mounting as a result of the prevailing trends in industry, and above all the continued shortage of labour and materials has substantially delayed the maintenance and improvement of farm properties on which future productive capacity largely depends.

Australia must think in terms of greater output for most of her primary commodities, not merely by mechanization but also by real efforts to remove the hindrances to production arising from high costs and labour shortage, and in doing so of encouraging a higher proportion of migrants into primary industry.

At the same time we need to re-think the basis of agricultural prices and marketing arrangements. The effort to fix returns to growers in terms of cost of production and to sell export surpluses on the basis of government-to-government trading is setting up a rigid organization subject to political pressure and bargaining. Such systems are more likely to bring about and perpetuate maladjustments in commodity markets than to reconcile a shifting pattern of demand by gradual change.

SECONDARY INDUSTRY.

The structure of Australian secondary industry has continued to broaden in the past year in line with post-war trends. The supply of capital goods from overseas has improved, and hopes are still high for a large industrial future for Australia. On the whole, too, output has shown some improvement, but this is little more that the reflection of an increase of about 4 per cent. in employment during 1949/50.

There is still a serious deficiency in the supply of basic materials and power to industry. Coal production and the dependent iron and steel output are not expanding at the necessary rate because of both an absolute shortage of labour and the continued prevalence of industrial disputes, which keep existing capacity in a state of underemployment. In addition, further serious hindrance is caused by the general inefficiency of transport, which results in frustrating delays on the railways and at the ports in moving both bulk commodities and finished goods.

Rising costs are also a serious problem. Strikes and intermittent interruptions to output are an important factor in their growth, but they are by no means alone. The shorter working week has added greatly to costs of production, not only directly, but perhaps just as much through its indirect effects on the cost of other services like transport. In addition, industry will have to bear the burden of the large increase in the basic wage.

The effects of these trends on the prospects of Australian industry are not hard to assess. In the first place, it is obvious that Australia has lost many of her advantages with which she emerged from the war. Hopes of export markets for manufactured goods, for instance, have greatly diminished since Australia could not fulfil orders or could ship abroad only at non-competitive prices. Secondly, increasing competition from imported goods has been felt even in the Australian market.

OVERSEA TRADE AND THE BALANCE OF PAYMENTS.

The size of oversea reserves is perhaps not a very reliable guide to the strength of the oversea position while they contain unknown quantities. On the other hand, dangers arising from so-called "hot money" appear to be exaggerated. Large amounts of seemingly speculative and idle funds, for instance, are really anticipating future investment in Australia. Undoubtedly exchange appreciation would lead to withdrawal of some of the funds transferred to Australia, but the remaining London funds would still be adequate to provide a reserve for future imports even should export earnings decline.

(Turn to page 88.)

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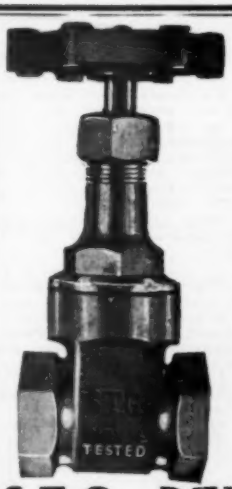

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(Continued from page 86.)

BANKING.

Trading bank advances have played very little part in contributing to the inflationary situation. The most that can be expected of banking policy is that it should avoid adding to the pressure.

Drastic restriction of bank credit is likely to add little to an attempt to check or reverse inflation; there is a limit to which credit can be restricted and yet still keep the wheels of commerce and industry turning at a satisfactory rate.

Late Open Tenders

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Moulding Powder (Sch. N.S.W. 493). Dec. 22.

Paper Towels (Sch. N.S.W. 500). Dec. 22

Platinum Wire (Sch. N.S.W. 495). Dec. 22.

Steel Racks (Sch. N.S.W. 502). Dec. 15.

Toolmakers' Lathes (Sch. V.-431). Dec. 12.

Tools, Hand or Machine (Sch. V.430). Dec. 12.

DEPARTMENT OF CIVIL AVIATION.

Mobile Cranes, 5-ton (Sch. 323). Dec. 19.

DEPARTMENT OF WORKS AND HOUSING.

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High Speed Tapping and Threading Machines. Dec. 21.

Rotary Converters. Dec. 15.

Surface Grinding Machine. Dec. 14.

GOVERNMENT RAILWAYS DEPARTMENT.

Condemned Black Iron Chain, 25 tons, Purchase of. Dec. 13.

Oil Circuit Breakers, Indoor Type (33,000 Volt., 1,000 MVA) and Associated Equipment, for Prince Alfred Sub-station and Bondi Junction Sub-station (Spec. 1279). Feb. 14.

Scrap Aluminium Alloy, 3 tons, Purchase of (List No. 151). Dec. 13.

DEPARTMENT OF MAIN ROADS.

Conveying and Screening Machinery, for Aggregate Plant at Department's Maintenance Depot, Granville. Jan. 30.

Conveyor Belt. Dec. 12.

Crimped Wire Mesh Panels. Dec. 14.

Steel Drums, 4-Gallon. Dec. 14.

Table-Top Lorry. Dec. 19.

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Refrigerated Bar Cabinet. Dec. 15.

MISCELLANEOUS.

Caravans (2), Two-Berth, with Stores Compartment, Two-Wheel, Pneumatic Tyred, for Moreton Shire Council. Dec. 13.

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Centrifugal Pump, Direct Electric-driven, for Townsville Regional Electricity Board. Dec. 27.

Tractor, 60 H.P., Hydraulic or Cable Operated Bulldozer or Angledozer, for Aramac Shire Council. Dec. 12.

Tractors (2), 25 to 45 H.P., with Dozer Attachments, for Banana Shire Council. Dec. 11.

WEST AUSTRALIA

GOVERNMENT TENDER BOARD.

Pumping Equipment, Electric (Sch. 652A). Dec. 14.

EXPANSION OF NILSEN GROUP.

Mr. O. V. A. Nilsen, acting chairman, said at the recent annual meeting of Oliver J. Nilsen (Aust.) Ltd., that progress and expansion have attended their activities throughout the year and that such conditions are calculated to continue. "Plant expansion," he said, "has been necessary to meet the increasing demand for the company's products. A new kiln just completed at the porcelain factory is expected to be in operation before Christmas. New fuse and switch gear products have been manufactured and recently improved equipment is now being delivered to clients. There is, in short, an increasing demand over the whole range of the company's products and services."

DEPARTMENT OF RAILWAYS—NEW SOUTH WALES.

TENDERS enclosed in sealed envelopes which must be endorsed "TENDER FOR . . . .", addressed to the Commissioner for Railways, 19 York Street, Sydney, will be received on the date and time shown for services specified. Tenders may be lodged in the Tender Box, Room 504A, 5th Floor, Railway House, 19 York Street, Sydney, or posted to the above address.

Wednesday, 14th February, 1951—12 noon.

For the supply, delivery and erection of 33,000 volt., 1,000 MVA Indoor Type Oil Circuit Breakers and Associated Equipment, for Prince Alfred Sub-station and Bondi Junction Sub-station, to Specification No. 1272. Copies, price 5/- each, obtainable from Chief Electrical Engineer, 19 York Street, Sydney.

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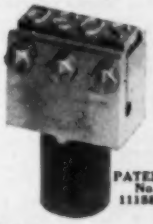

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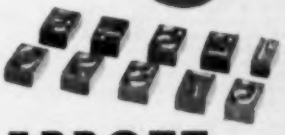

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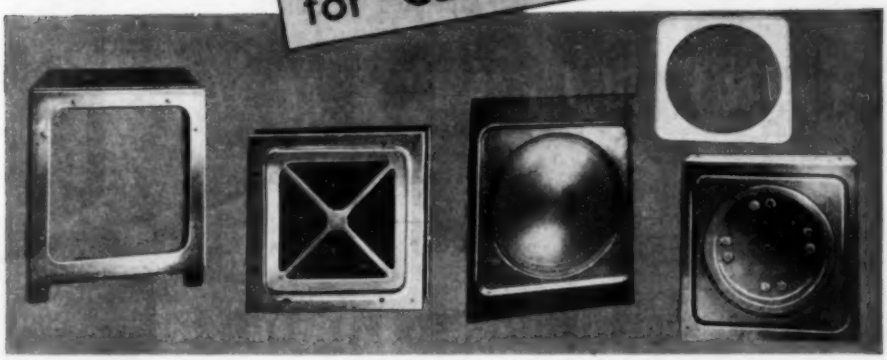
for "Cast-to-form" dies



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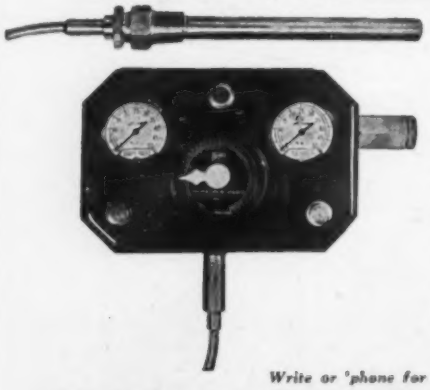

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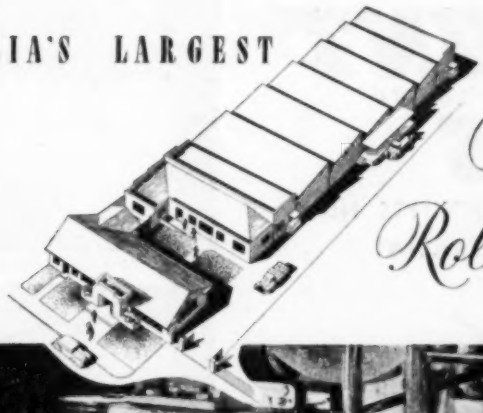

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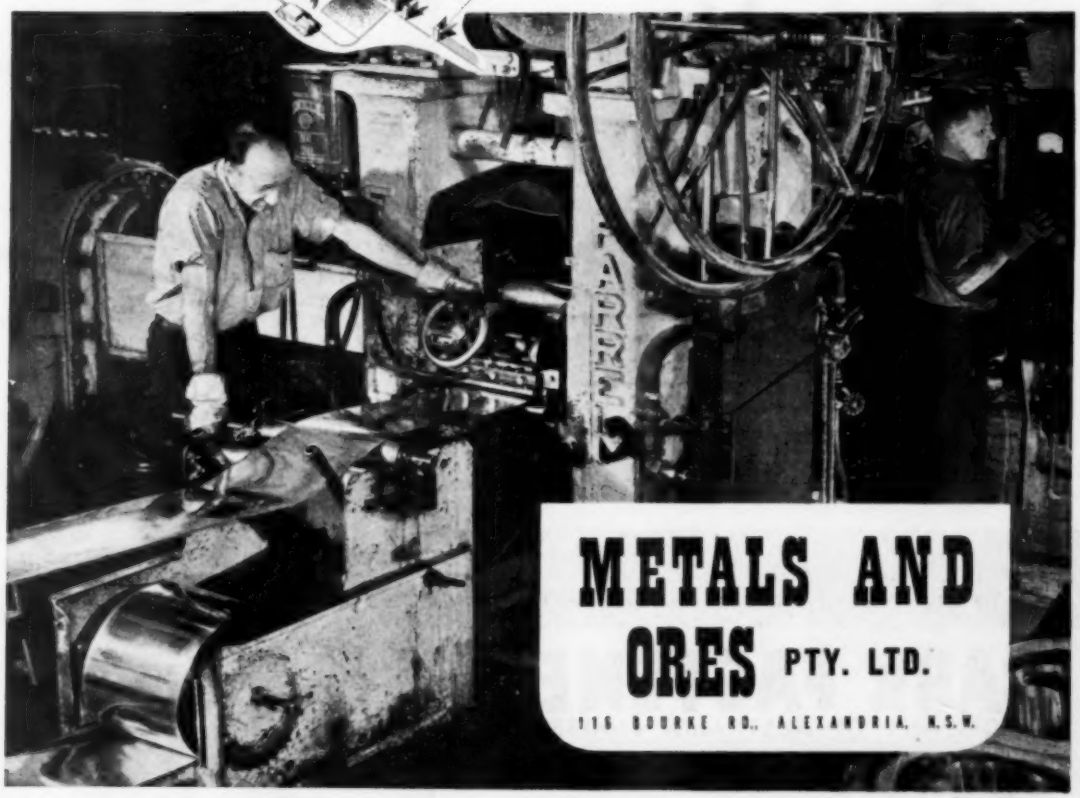

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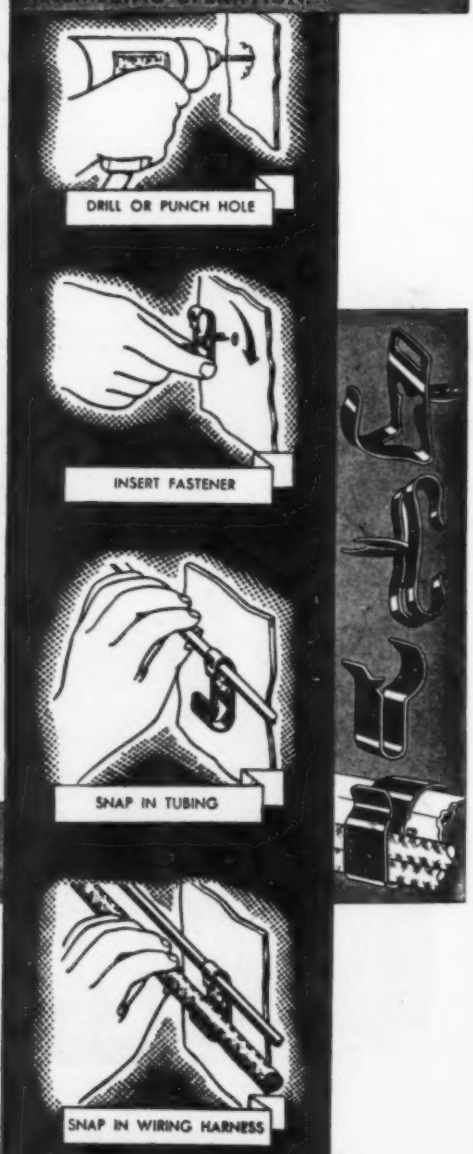

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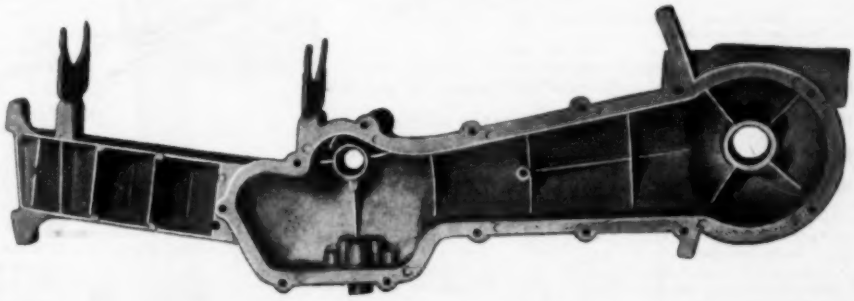
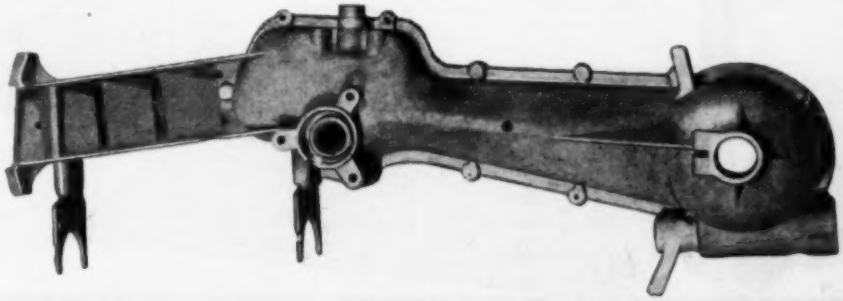


Illustrated is the Gear Case of a well-known model of Washing Machine pressure diecast in Zinc Alloy. This Diecasting is probably the largest produced in Australia commercially to date and is 27in. long, 4½in. high, 6in. wide, and weighs 10lbs. Steel inserts are cast for motor supports and bearing and screw holes are included in the casting.



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Illustrated at right: *The Conveyancer Mark XVI. Diesel-engine drive with twin pneumatic tyres, 12-feet lift (full loaded) in 18 seconds—rated for heavy duty.*

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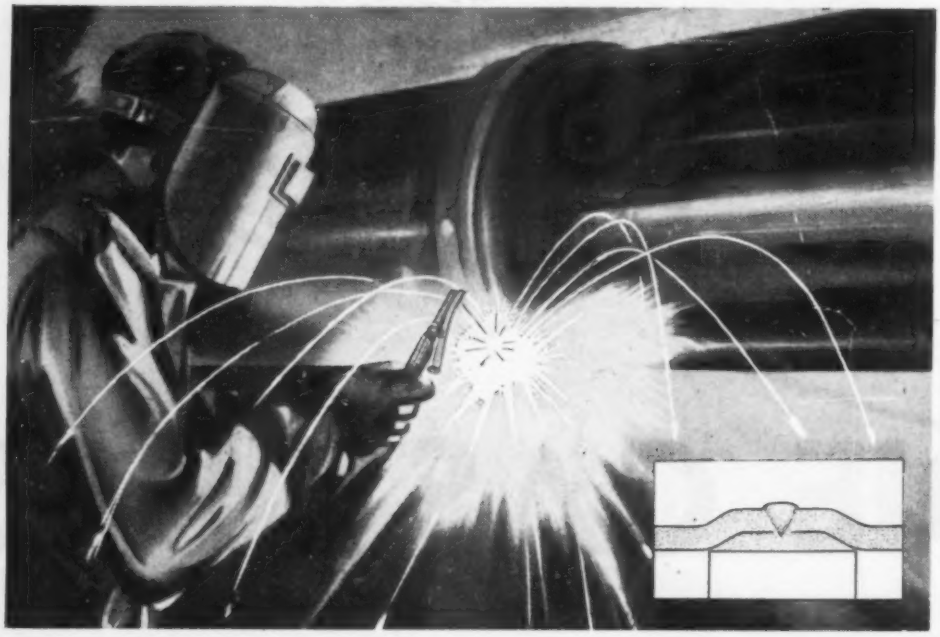

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Australia *Tomorrow!*

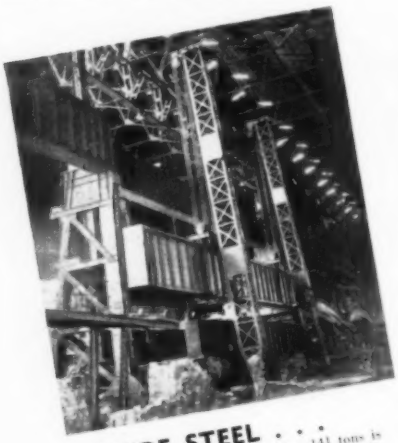
HERE'S present activity for future progress in the steel industry. The pictures tell the story, in part, of the industry's great developmental and expansion projects at Port Kembla, New South Wales.

At the Australian Iron & Steel Ltd. Kembla Works, and at the Company's South Coast Collieries, work is proceeding steadily on a balanced programme of construction, the main items of which include:

- Development of new completely mechanised collieries;
- Doubling of coke oven capacity;
- A third blast furnace;
- Two new open hearth furnaces;
- Hot and cold strip mills and tinplate plant.

Completion of this programme will increase the Australian industry's annual steel capacity from 1,750,000 tons to 2,300,000, and will make Port Kembla one of the world's most modern and comprehensive steel-producing centres.

MORE IRON: Progress of construction of Kembla's No. 3 blast furnace. With a capacity of 1,500 tons of iron per day, this furnace will rank with the world's biggest and help to meet the demand for more iron created by the enlargement of Kembla's steel making facilities.



MORE STEEL . . . Here, a 110 ft. girder weighing 141 tons is shown being raised into position by 75 ft. lifting masts at the open hearth plant whose enlargement will raise Kembla's weekly steel-making capacity to 25,000 tons.

COLLIERY DEVELOPMENT: Shown above is the conveyor belt system by which coal won from the A.I.S. Nebo Colliery is transferred from the Bradford breaker building (where it is crushed to the size required for coke making) to the 2,000 ton loading bin (in left background).

OPPORTUNITY! **The steel industry's expansion can mean opportunity for you either in a professional or tradesman's capacity, or as a member of the industry's employee training scheme. You are invited to write to the Company for further particulars of the wide range of employment opportunities available.**

MORE HOMES: Situated on the shores of Lake Illawarra, these two, three and four-bedroom brick homes are indicative of the efforts being made by the N.S.W. Housing Commission to provide dwellings at Port Kembla.

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Head Office: 422 Little Collins Street, Melbourne

FABRICATING WORKS: Alexandria, N.S.W., and South Melbourne, Victoria.

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